



IMAGE^{net}TM

DIGITAL IMAGING SYSTEMS



Table of Contents

Chapter 1	Introduction	5
1.1	Overview	5
1.2	IMAGEnet Capture DLL	6
1.3	IMAGEnet Database	6
Chapter 2	Using IMAGEnet	8
2.1	Starting IMAGEnet	8
2.2	IMAGEnet Components	9
2.3	Operating IMAGEnet	13
2.4	Exiting IMAGEnet	13
Chapter 3	Capturing Images	14
3.1	Selecting Capture Procedure	14
3.2	Registering Patient	14
3.3	Start Capturing	15
3.4	Viewing Captured Images	16
3.5	Deleting Captured Images	17
3.6	Flushing Captured Images	17
3.7	Saving Captured Images	18
3.8	Working with the Capture Window	18
Chapter 4	Displaying Images	20
4.1	Selecting Database	20
4.2	Selecting Patient	20
4.3	Selecting Image	22
4.4	Working on Image Window	24
Chapter 5	Saving Images	26
Chapter 6	Using Tools	28
Chapter 7	Printing Images	32
7.1	Print Dialog Box	32
7.2	Print Preview Screen	32
7.3	Print Setup Dialog Box	33
7.4	Selecting Print Template	33
7.5	Print Adjustment Panel	34

Chapter 8	Using Utilities	36
8.1	Editing Proofsheets	36
8.2	Copying/Deleting Images	37
8.3	Checking Database Files	40
8.4	Showing Archive Disk Information	40
8.5	Initializing Archive Disk	40
8.6	Importing an Image from a File	40
8.7	Exporting an Image to a File	41
8.8	Using Quickdraw	41
8.9	Transferring Image to Clipboard	45
8.10	Measure and Compare	45
Chapter 9	Managing Patients	51
9.1	Accessing Patient Information	51
9.2	Registering New Patients	51
9.3	Deleting Patients	52
Chapter 10	Exchanging Images	54
10.1	Preparation	54
10.2	Sending Image by Mail	54
10.3	Retrieving Image in Mails	55
Chapter 11	Setting Options	57
11.1	General Options	57
11.2	Patient Options	58
11.3	Display Options	59
11.4	Tools Options	61
Chapter 12	Other Features	62
12.1	Adjusting Window to Image	62
12.2	Changing Display Image Size	62
12.3	Duplicating an Image Window	62
12.4	Hiding Tool Bar and Status Bar	63
12.5	Cascade, Tile and Arrange Icons	63
12.6	Getting Help	63

Appendix A	Print Template	65
A.1	Overview	65
A.2	Creating Print Template	66
Appendix B	Jukebox Support	68
B.1	Displaying an Image from a Jukebox	68
B.2	Copying Images from a Jukebox	69
Appendix C	CD Archiving	70
C.1	Overview	70
C.2	Using CD recording utility	70
C.3	Verifying the CD	72
C.4	Miscellaneous	72
Appendix D	Taskpad	73
D.1	Overview	73
D.2	Installation of Taskpad	74
D.3	Taskpad Configuration	75
D.4	Taskpad.CFG	76
Appendix E	Flexmail	78
E.1	Overview	78
E.2	Configuring Transmission	79
E.3	Setting the Destination	79
 Optional Modules:		
Appendix F	MPS Disk area / PDT Circles	81
Appendix G	Mosaic 2000	85
Appendix H	OIS Image Viewer	89
Appendix I	Endothelial Cell Analysis	91
Terms & Conditions		103

Precautions

- Please read this User's Manual with care before using this software.
 - TOPCON has the copyright of the software.
 - Reproduction and copying of the software and the User's Manual, in whole or in part, without our permission is strictly prohibited.
 - This User's Manual does not describe details about the handling procedures of personal computer and the operation procedures Microsoft Windows 95/NT. This User's Manual is made on an assumption that the user already has the knowledge about the personal computer and Microsoft Windows 95/NT.
 - For the handling procedures of personal computer and the operation procedures of Microsoft Windows 95/NT, refer to the pertaining manuals.
 - An incorrect handling of personal computer and an incorrect operation of Microsoft Windows 95/NT may damage the personal computer, Microsoft Windows 95/NT or the software.
 - We shall not take any responsibility for the effects as a result of using the User's Manual and software.
 - Specifications of the software and descriptions of the User's Manual are subject to change without prior notice.
-

IMAGEnet User's Manual

June 15, 2005 (C) Topcon Medical Systems, Inc.

IMAGEnet is a registered trademark, and IMAGEnet, IMAGEnet for Windows, IMAGEnet-X, IMAGEnet-H, IMAGEnet-640, and IMAGEnet-1024 are trademarks of TOPCON Corporation.

Microsoft, MS and Windows are registered trademarks, and Windows NT is a trademark of Microsoft Corporation.

Btrieve is a registered trademark of Pervasive Software, Inc.

Chapter 1

Introduction

1.1 Overview

IMAGEnet is advanced 32-bit image filing software that runs under Windows 95/98 and Windows NT. IMAGEnet has a user interface similar to IMAGEnet-640 and IMAGEnet for Windows, providing ease of operation for those who are familiar with these systems. In addition, IMAGEnet features a new enhanced database structure that enables much more flexible data exchange with other information systems.

IMAGEnet is a device independent platform. Unlike the DOS based IMAGEnet systems, there is no distinction among the systems such as 640 and 1024, B/W and color. The capturing part of IMAGEnet is controlled by a DLL (Dynamic Linking Library) module designed for a particular capture device. A capture procedure can use any of the included DLL modules. Added support for TWAIN compliant devices allows the capturing and storing of images from film scanners and digital interface cameras that support the TWAIN interface.

IMAGEnet supports multiple database configurations over networks. It is possible to have more than one database anywhere on the network to easily switch to that database. This feature gives great flexibility to configuring the total network system. Images can be copied among the databases as simply as copying images from the system hard disk to an archive disk has always been.

IMAGEnet now supports an image data exchange function using a regular phone line or Internet. This will add the ability to do so called 'telemedicine' with the system. As soon as an image is taken, the image may be sent anywhere around the world with a few mouse clicks.

Compatibility

Since IMAGEnet uses a completely new enhanced database structure, IMAGEnet will not directly access an existing IMAGEnet database. However, a conversion program is provided for existing databases and IMAGEnet even provides a way to exchange image data with existing systems using an image information file compatible with the existing IMAGEnet systems.

1.2 IMAGEnet Capture DLL

As mentioned above, IMAGEnet uses a capture DLL to capture images from a capture device. These capture DLLs are considered a part of IMAGEnet, it isn't possible to capture images from a device without one of them. For IMAGEnet Version 2.00, the following capture DLLs are available:

- Coreco Oculus-TCX (640x480 or 768x576 B/W, Color, Windows 95/98 only)
- Coreco Oculus-F/64 (1024x1024 B/W, Windows 95/98 only)
- Coreco Oculus-TCi (640x480 or 768x576 B/W, Color, 1024x1024 B/W)
- Matrox Meteor/RGB (640x480 or 768x576 B/W, Color)
- Universal TWAIN interface

These DLLs may be used on a same system together, except for a Meteor and TCi together, as long as the capture hardware is installed. Two or more TWAIN compliant devices can be connected to the system, though images from only one device at a time can be captured. New capture DLLs for new hardware will be added as they become available and have sufficient benefit over currently supported devices.

1.3 IMAGEnet Database

An image captured by IMAGEnet consists of information of many kinds. They include patient information, such as the patient ID. code and the patient name, image information, such as captured date and the procedure name, and specific image data. IMAGEnet maintains this information using the most efficient way.

Since one patient has two or more images in most cases, the patient information and the image information are stored and maintained separately. The actual image data is stored in a separate file, called the image file, because the image data is never accessed until the image is displayed.

A group of the data files that contain the patient information and the image information is called the database. The database is a group of structured data files that makes retrieving particular data, an image, in the data files quickly. IMAGEnet uses 2 types of databases, one is called the system database and the other is called a storage drive. It is easy to switch the database to be accessed in IMAGEnet without exiting the program.

System Databases

The system database is a truly structured database which consists of several data files. The data files are kept and maintained in the database directory, and image files are stored in the image files directory. These directories are located on a hard disk of the computer. The images may be stored on a permanent archive disk, such as a CD-ROM or an optical disk. IMAGEnet accesses the system database located on a remote computer as

well. However, the system database must be prepared and defined using the system configuration program.

IMAGEnet will not access to the existing database for IMAGEnet-640, IMAGEnet-1024 and IMAGEnet for Windows. These databases must be converted once before starting to use IMAGEnet.

Storage Drives

IMAGEnet is also able to store images to any disk drive including remote drives on remote computers. The storage drive is very convenient for storing images temporarily. Floppy diskette and any other removable media can also be used as a storage drive to carry images from one IMAGEnet to another.

In the storage drive, image files are stored in the root directory of the storage drive. Patient and image information are stored in a file called DATAFILE. DATAFILE is created in the root directory or in any sub-directory. DATAFILE is not a structured database file, but contains complete information of the images. IMAGEnet still supports INFOFILE and ARCHIVE for the case that exchanging image data with an existing system.

Unlike the system database, the storage drive does not require any preparation for use. IMAGEnet automatically creates DATAFILE on the storage drive if it does not exist, and automatically removes it if all images on the storage drive have been erased. This is very important, especially in case of an emergency, such as having too many captured images to be saved to the system database, or the system database is on a busy network. Even in such cases, it is possible to safely save the captured images to a storage drive.

Chapter 2

Getting Started

2.1 Starting IMAGENet

On the title bar of Windows 95/98 and Windows NT, there will be the 'Start' button on the left. Click the 'Start' button to open the start menu. Choose 'Programs' then choose 'TOPCON IMAGENet' from the submenu. In the 'TOPCON IMAGENet' submenu, choose the 'IMAGENet' to start IMAGENet.

In the 'TOPCON IMAGENet' submenu, there will be 3 items (Figure 3-1):

- IMAGENet : Running IMAGENet
- Configuration : Running the Configuration Program
- Read Me : Display the Read Me file.

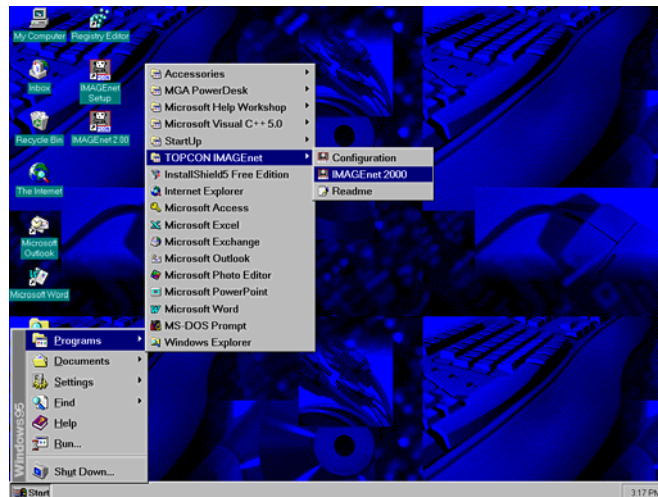


Figure 2-1 Starting IMAGENet

IMAGENet loads the first database registered in the system registry or found through the drive search. The database name will be shown on the title bar at the top of the IMAGENet window.

2.2 IMAGEnet Components

IMAGEnet Window

The IMAGEnet window consists of several elements such as the title bar, the menu bar, the tool bar and the status bar. The title bar is located at the top of the window, then the menu bar is just below, then the tool bar in gray. The status bar is located at the bottom of the window.



Figure 2-2 IMAGEnet Window

Images are displayed in child windows called 'Image Window's in the IMAGEnet window. The image window is created when an image is opened and is removed when the image is closed. The IMAGEnet window is maximized on start up to make room for image windows as large as possible. It is possible to make the window smaller, however, the image windows can never be larger than the IMAGEnet window.

In addition to the *normal* image window, there are 2 more image windows. One is for image capturing, and the other is for proofsheets editing. The image window used for image capturing is called 'Capture Window', which has a control dialog bar at the bottom of the window. The image window used for the proofsheets editing is called 'Edit Window', which also has a control dialog bar at the bottom. These 2 image windows are quite similar to the *normal* image window, and can be treated as a normal image window in most situations.

Title Bar

The title bar is used to show the database currently loaded. When an image window is maximized, image information is also displayed.

Menu Bar

The menu bar consists of several items. By clicking these items, the pull-down menu related to the item will be opened. By choosing an item in a pull-down menu, you can call the function assigned to the item.

[File]	Open... Close* Save...* Close All* Print...* Print Preview* Print Setup... Print Template... Retrieve Mail... Send Image...* Note...* Exit IMAGEnet
[Patient]	Select Patient... Sort by Name Register Patient... Delete Patient... Select Database/Drive...
[Capture]	Capture Procedure #1 Capture Procedure #2 . . . Buffering on Hard disk
[Tools]*	Undo Negative Image Expand Contrast (Hi, Med., Lo, Equalize) Adjust Contrast/Color... Box Enhancement Smooth Image (Hi, Med., Lo) Sharpen Image (Hi, Med., Lo) Mirror/Rotate Image (Mirror/Rotate/Flip) Add to 4UP Add to 9UP Add to 16UP Annotate Image Permanent Graphics Delete Graphics
[Utilities]	Edit Proofsheets... Copy/Delete Images... Check Database Files Archive Disk Information... Initialize Archive Disk... Import Image... Export Image...*

	Transfer Image to Clipboard*
	Measure Image...*
	Compare Images...*
[View]	Toolbar (Top, Bottom, Left, Right, Hide)
	Status Bar
	Display Scale (50%-200%, Maximum, Resize)
[Window]*	Adjust to Image
	Duplicate
	Cascade
	Tile
	Arrange Icons
[Help]	Help Topics
	About IMAGENet...

In the above, menu items with a '*' are not available, either hidden or grayed, when an image is not displayed.

Tool Bar

The tool bar provides quick access to items in pull-down menus of the menu bar. By clicking an icon on the tool bar, the function assigned to the icon is directly called. Some of these icons will be disabled if no image is displayed on the screen. The following is the relation between the tool bar icons and the menu bar items.

	Database Icon	Select Database...	[Patient]
	Patient Icon	Select Patient...	[Patient]
	Image Icon	Open...	[File]
	Note Icon	Note...	[File]
	Save Icon	Save...	[File]
	Clipboard Icon	Transfer to Clipboard	[Utilities]
	Print Icon	Print...	[File]
	Adjust Icon	Adjust to Image	[Window]
	Duplicate Icon	Duplicate Window	[Window]
	Negative Icon	Negative Image	[Tools]
	Contrast Icon	Contrast Stretch	[Tools]
	Enhance Icon	Box Enhancement	[Tools]

	Annotate Icon	Annotate Image	[Tools]
	Undo Icon	Undo	[Tools]
	Proofsheet Icon	(None)	(None)
	4UP Icon	Add to 4UP	[Tools]
	9UP Icon	Add to 9UP	[Tools]
	16UP Icon	Add to 16UP	[Tools]
	Help Icon	Context Help	[Help]

The tool bar also provides the ability to resize the image on the screen. The drop down list box on the tool bar shows the current display size as a percentage of the original size, and lets the operator quickly changes the display size of the image on the screen.

Status Bar

There are 4 display fields on the status bar. The 1st (the most left) field is used to show the status of IMAGEnet. The 2nd field is used to show the patient ID code when a patient is selected. The 3rd field is used to show free disk space on the drive where images are to be saved. The 4th (the most right) field shows the clock.

Image Window

When an image is displayed on the screen, a new window for the image is created in the IMAGEnet window. Though you can have two or more image windows on the screen, only one can be active. Most functions work on the image in the active image window. Each image window has the title on the top to show identification information of the image.

2.3 Operating IMAGEnet

Once IMAGEnet is started, choose a command or an operation to perform from the menu bar. Use the menu icons on the tool bar as a short cut for some menu items. A menu item or a menu icon displayed in gray means that the item or the icon is not available.

To capture images, choose a capture procedure to perform from the [Capture] menu. To display images, choose 'Open...' from the [File] menu. IMAGEnet will display a dialog box to get necessary information. Type or select items in the dialog box, then click 'OK' to continue. To apply any tools to the displayed image, choose a tool from the [Tools] menu. The tool will be immediately applied to the image.

For any questions about the operation, press the F1 key anytime. IMAGEnet will display the necessary help needed at that point. It is good idea to view the major topics in the IMAGEnet Help before starting using IMAGEnet. To get contents of Help topics, choose 'Help Topics' from the [Help] menu.

2.4 Exiting IMAGEnet

To exit IMAGEnet, choose 'Exit IMAGEnet' from the [File] menu. IMAGEnet confirms that you want to exit. Upon exit, IMAGEnet closes all image windows and releases resources. Before exiting IMAGEnet, save an images modified during the session or they will be lost. IMAGEnet does not prompt to save modified images on exit.

To copy an image to Clipboard, be aware that the image data is still in the Clipboard. IMAGEnet does not prompt to discard the image data in the Clipboard upon exit. Remove the image data from Clipboard using Clipboard Viewer if it is no longer needed.

Chapter 3

Capturing Images

Capturing images in IMAGEnet, usually requires the following steps.

- Select a capture procedure.
- Register or select a patient.
- Start capturing using a capture device for the procedure.
- Save captured images to a database or a storage drive.

The above operations are done through the menu bar of the IMAGEnet window.

3.1 Selecting a Capture Procedure

To select a capture procedure, choose the desired capture procedure from the [Capture] menu. The capture procedures are defined using the Configuration Program, and the definition contains all necessary settings for the capture device and the capture DLL.

To store captured images temporarily on the hard disk rather than in system memory, choose 'Buffering on Hard disk', the last item in the [Capture] menu. A check mark will be placed at the head of 'Buffering on Hard disk' in the pull-down menu. If a very high frame rate is not your concern, choosing this setting will eliminate the risk of losing images before they have been saved to disk.

Compared with storing captured images in system memory, storing them on the hard disk requires far less Windows resources. In addition, since captured images are always backed up securely on the hard disk, you will be able to recover them completely even if an accidental power failure or unexpected system crash occurs.

3.2 Registering Patient

Once a capture procedure has been selected, the patient registration dialog box will be automatically displayed.

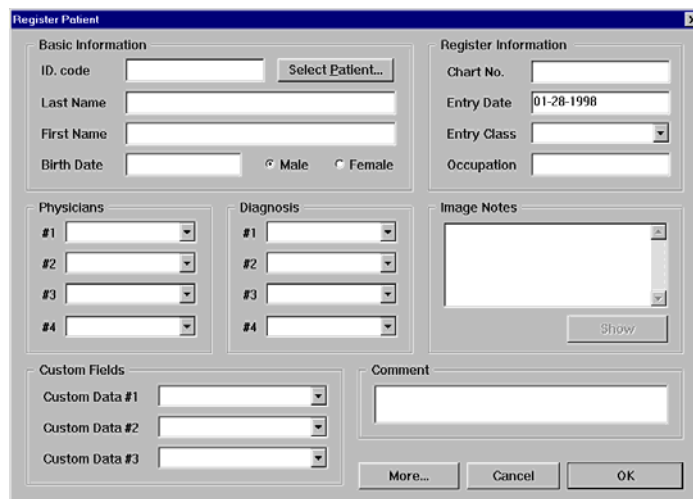
The image shows a 'Register Patient' dialog box with a blue title bar. It is divided into several sections: 'Basic Information' with fields for ID code, Last Name, First Name, Birth Date, and gender (Male/Female); 'Register Information' with fields for Chart No., Entry Date, Entry Class, and Occupation; 'Physicians' and 'Diagnosis' sections, each with four dropdown menus labeled #1 through #4; 'Image Notes' with a text area and a 'Show' button; 'Custom Fields' with three dropdown menus labeled Custom Data #1, #2, and #3; and a 'Comment' section with a text area. At the bottom are 'More...', 'Cancel', and 'OK' buttons.

Figure 3-1 Patient Registration Dialog Box

To capture images for a new patient whose information is not registered anywhere, fill the patient information fields in the dialog box. At least the patient ID. code and the patient name must be entered. Other information fields may be left blank. They can be entered or changed later.

To capture images for a patient whose information is already registered in the database, click the 'Select Patient...' button. The select patient dialog box will be displayed to select a patient from the patient list. See "4.2 Selecting a patient" for detail.

After entering the necessary information fields, click 'OK' to start capturing.

3.3 Start Capturing

The capture window looks like any another image window, with the addition of a control dialog bar at the bottom. The control dialog bar allows the changing of device parameters such as the viewing angle and the left or right eye.

To capture an image, use the trigger button of the capturing device, a retinal camera or a slit lamp. To capture images using a non-flash device, use the space bar as the trigger button.

When the trigger button is pressed, an image is captured and is displayed in the capture window. IMAGENet beeps when it's ready for the next capture. All the images captured are stored in the image buffer. The number of images that can be captured at a time depends on the systems resources.

Timer: When a capture window requiring a timer is opened, the timer is made ready, but is not started. Before starting a timer, it must first be "primed". To do this, click the

clock icon on the control dialog bar. You will now see the ghosted digits of the timer. If the capturing device trigger is pressed, the space bar is pressed, or the clock icon is again clicked, the timer will begin. To restart a running timer, click the clock icon. A message will appear to confirm the restart.

Timers for each patient and procedure continue to run until the IMAGenet program is closed. If a patient is recalled for the same procedure, a message will appear asking if currently running timer should be used.



Figure 3-2 Capture Window

3.4 Viewing Captured Images

In the capture window, any captured image can be displayed using the left arrow button and the right arrow button on the control dialog bar. These buttons change the displayed image to the one before (previous) and the one after (next).

To view captured images as a proofsheets, click the Proofsheets icon on the control dialog bar. This will change the display mode of the capture window to the proofsheets display mode. While you are in the proofsheets display mode, the left arrow button and the right arrow button work for changing the proofsheets to be displayed if there are 2 or more proofsheets. To go back to the normal display mode, just click the proofsheets icon again. Double click the image to display on the proofsheets to display it.

3.5 Deleting Captured Images

Delete a captured image that is being displayed in the capture window anytime by clicking the 'Delete' button on the control dialog bar.

If in the proofsheets display mode, click the images to delete first using the mouse. The clicked images are framed by a yellow line to show them as marked. The proofsheets can be changed while marking images to be deleted. Then click the 'Delete' button on the control dialog bar. All the images marked will be deleted.

3.6 Flushing Captured Images

In the case where many images have been captured, the capture interval will become longer and the hard disk will blink its light very often. This shows Windows has started memory swapping to make more room in system memory. To eliminate this, flush captured images in memory to the hard disk by clicking the gas pump icon on the control dialog bar.

Flushing images to the hard disk also secures the captured images from accidental power failures and unexpected system crashes. Captured images will be automatically recovered when the [Capture] function of IMAGEnet is called next.

Flushing images to the hard disk does not affect the operation of the capture window. The images are treated just as if they are in the system memory. If "Buffering on Hard disk" is checked in the [Capture] menu, a captured image is immediately flushed to the hard disk automatically.

3.7 Saving Captured Images

To save captured images, choose ‘Save...’ from the [File] menu, or click the save icon on the tool bar. The following dialog box will be displayed to select destination and to decide the style.

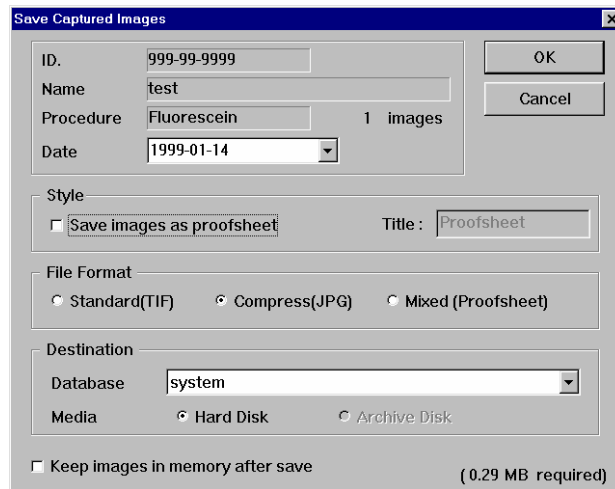


Figure 3-3 Save Captured Images Dialog Box

Captured images may be saved either as a proofsheets or as single images.

Click ‘OK’ to start saving the captured images. After all the images are saved, the capture window will be closed and the capture procedure will conclude.

To keep the capture window after a save, check the “Keep images in memory after save” check box. This might be done if the images are to be saved to more than one place.

3.8 Working with the Capture Window

It is possible to open a new capture window even while capturing images. Just start another capture procedure by choosing a capture procedure from the [Capture] menu. No restriction is applied to the second capture procedure. The same capture procedure may be started for the same patient.

For selecting the capture procedure among the capture windows being opened, simply click the desired capture window to capture images. That capture window becomes active and the image captured next will be sent to that capture window.

To quit a capture procedure, choose ‘Close’ from the [File] menu or use the system menu of the capture window. Access the system menu of the window by clicking the square at the upper left corner, the left end of the title of the window. Quitting a capture procedure, will loose all the images captured including images flushed to the hard disk.

Since the capture window is quite similar to the *normal* image window, it may be treated as a normal image window in most cases. Most tools in the [Tool] menu, printing any images or even a proofsheets displayed in the capture window are all possible. This is one of the great features of IMAGEnet.

Chapter 4

Displaying Images

An image is displayed through the following steps in IMAGEnet.

- Select a database to access.
- Select a patient.
- Select an image to be displayed.

The above operations are done through either the menu bar or the tool bar on the IMAGEnet window. (When IMAGEnet started up, only the database was selected.)

4.1 Selecting Database

To select a database or a drive to access, choose 'Select Database/Drive...' from the [Patient] menu, or click the database icon on the tool bar. The following dialog box will be displayed to select a database or a drive.

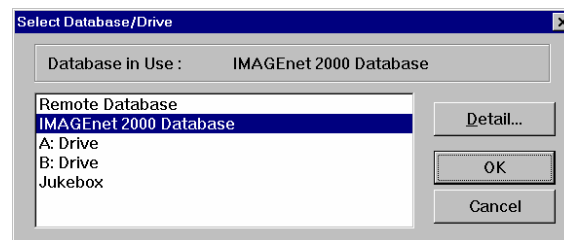


Figure 4-1 Select Database/Drive Dialog Box

Click a database or a drive to access from the database/drive list, then click 'OK'. The fixed drives that do not have either INFOFILE or HISTORY will not be listed here. To stay in the database or the drive currently used, simply click 'Cancel'.

Once a database has been selected, IMAGEnet automatically loads the database and displays the patient dialog box described in the next section.

4.2 Selecting Patient

To select a patient, choose 'Select Patient...' from the [Patient] menu, or click the patient icon on the tool bar. The following dialog box will be displayed to select a patient.

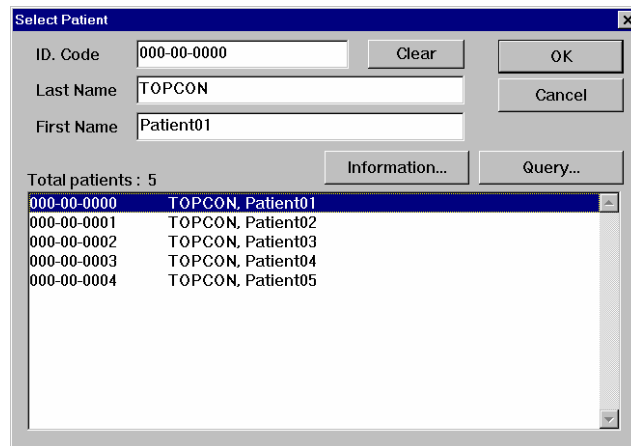


Figure 4-2 Select Patient Dialog Box

To select a patient, type either the patient ID code or the patient name in the corresponding edit box. Click a patient in the patient list to select the patient. Click 'OK' to start searching for images for that patient. Double click a patient in the patient list box to do these operations at once. Patients in the patient list are usually sorted by the patient ID code unless 'Sort by Name' in the [Patient] menu has been checked.

If the patient ID code entered does not exactly match any patient in the patient list, or if only a patient name is entered, IMAGENet displays a candidate list. For example, typing '100' as the patient ID code in Figure 4.3:

10002	Patient-A, Test
1001	Patient-B, Test
10016-1	Patient-C, Test

will list this candidate list because all the above ID codes are partially matched to the ID code entered. If only a patient name is entered, the candidate list is always displayed even when the name specified was matched exactly to the name of an existing patient.

Selecting from Candidate List

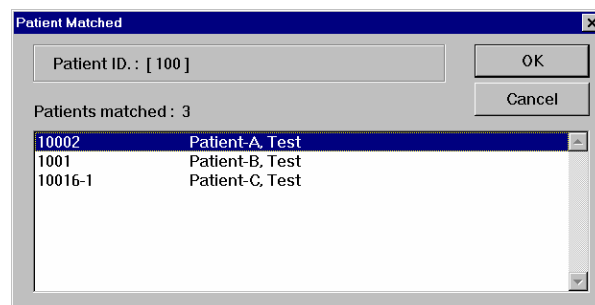


Figure 4-3 Candidate List

If the patient is in the candidate list, just click the patient in the list, then click 'OK'. Or, double click the patient to do these operations simultaneously.

Searching Patients for specific conditions

To search for patients with specific conditions such as the registration date and birth date, click the 'Query Patient' button in the patient dialog box. This will show the following dialog box that allows the specification of conditions.

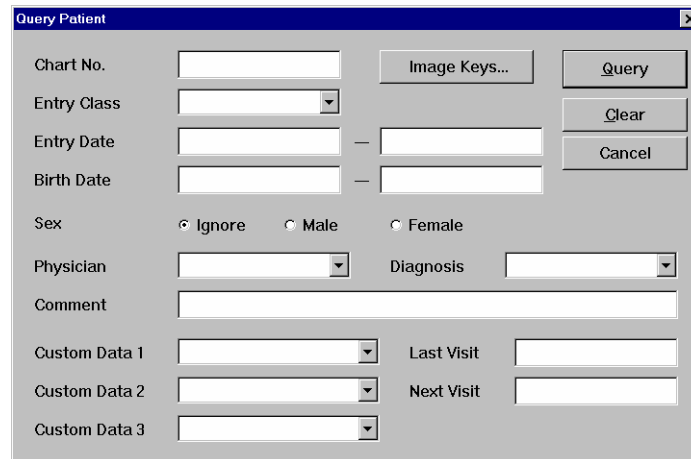
The image shows a 'Query Patient' dialog box with a title bar and a close button. It contains several input fields and buttons. On the left, there are labels for 'Chart No.', 'Entry Class', 'Entry Date', 'Birth Date', 'Sex', 'Physician', 'Comment', 'Custom Data 1', 'Custom Data 2', and 'Custom Data 3'. To the right of these labels are corresponding input fields: a text box for Chart No., a dropdown for Entry Class, text boxes for Entry Date and Birth Date with a separator, radio buttons for Sex (Ignore, Male, Female), dropdowns for Physician and Custom Data fields, and a text box for Comment. Further right, there are 'Image Keys...', 'Query', 'Clear', and 'Cancel' buttons. At the bottom right, there are 'Last Visit' and 'Next Visit' labels with text boxes.

Figure 4-4 Query Patient Dialog Box

Type in the condition of the patients to search for, then click the 'Query' button. Leave any condition fields blank to not use them as a query key. All patients who satisfy the conditions are found. IMAGEnet displays a query list similar to the candidate list shown in Figure 4.3. Just click the patient in the list, then click 'OK'. Or, double click the patient to do these operations simultaneously.

Unlike the candidate list, the query list is kept as the alternate patient list until another database is selected or all the conditions specified in the patient query dialog box are cleared.

Once a patient has been selected, IMAGEnet automatically searches the database and displays the image dialog box described in the next section.

4.3 Selecting Image

To select an image to display, choose 'Open...' from the [File] menu, or click the image icon on the tool bar. The following dialog box will be displayed to select an image.

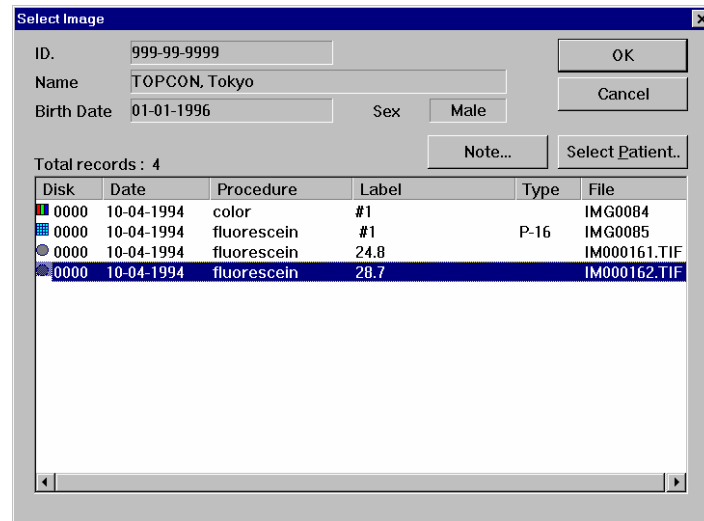


Figure 4-5 Select Image Dialog Box

The image list contains all images for the patient including images on optical disks. Images on the system hard disk are listed first, then images for each optical disk are listed. In each image record, optical disk No. '0000' means the system hard disk. 'P-nn' at the left of the image file name means that the record is a proofsheets with nn images.

The icon appeared at the left of each line shows the type of the image record.

-  () A B/W image
-  () A color image
-  () A proofsheets image

The icon in () shows the image has a note.

To display an image in the image list, highlight the image record desired, then click 'OK'. Or, double click the image record directly. The dialog box will be hidden, then the image will be displayed in a new image window.

If the image displayed is a proofsheets, click an image directly in the proofsheets to display the image. The image will be displayed in a new window overlapping the proofsheets window.

The image list will be kept until selection of another patient or another database. The above dialog box can be displayed anytime by choosing 'Open...' in the [File] menu or by clicking the image icon on the tool bar.

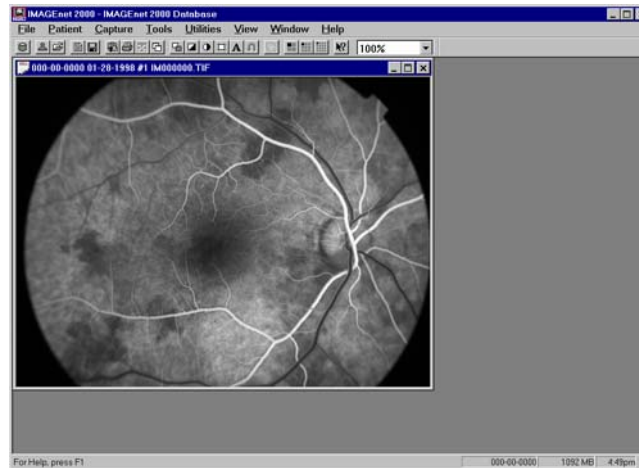


Figure 4-6 Image Window

Identification information such as the patient ID code, the capture date, the procedure name, and the image label are displayed as the title of the image window. What type of information should be displayed on the title may be customized. If the image window has been resized for some reason, it can be restored by choosing 'Adjust to Image' in the [Window] menu.

A proofsheets can be displayed using the *scaling mode*. In the scaling mode, the image is scaled to fit the image window so that the entire image can always be seen in the window.

4.4 Working on Image Window

Resizing an Image on the Screen

To resize an image displayed on the screen, activate the image window, then select the display size to be set from the drop down list box on the tool bar. If the display size is smaller than 100%, the image on the screen will be reduced. If the display size is larger than 100%, the image will be enlarged with that ratio. The original image data will not be changed. To resize the original image data permanently, select 'Resize' from the drop down list.

Closing an Image Window

To close an image window, make the window active, then choose 'Close' from the [File] menu or use the system menu of the image window. Alternatively, access the system menu of the window by clicking the square at the upper left corner, the left end of the title of the window.

Putting an Image Window on Top

Many image windows can be opened simultaneously. The number of image windows one can open is only limited by the amount of system memory. The image window opened last is displayed on top. To pull up an image window behind the top image window and place it on top, click anywhere on the image window using the left mouse button. Put the image window just underneath the top image window on top using the right mouse button. This action rotates all the image windows, including the capture windows and the edit windows, sending the top image window to the bottom.

Displaying Another Image in a Proofsheets

To display another image in a proofsheets, activate the proofsheets window first. To activate the proofsheets window, click anywhere on the proofsheets window. Alternatively, call back the proofsheets window by clicking the right mouse button anywhere on an image window.

After activating the proofsheets window, click an image in the proofsheets to display the image, just like the first image.

Chapter 5

Saving Images

IMAGEnet allows saving images displayed on the screen to any disk except archive disks. To save an image, activate the image window first by clicking anywhere on the window or using several click actions of the right mouse button. Choose 'Save...' from the [File] menu, or click the save icon on the tool bar. The following dialog box will be displayed to select a destination and to set parameters.

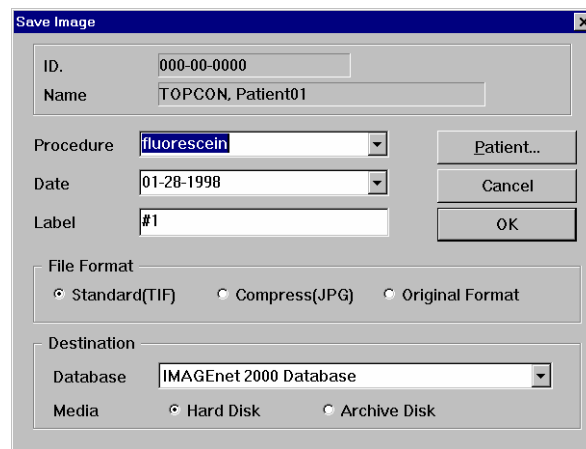


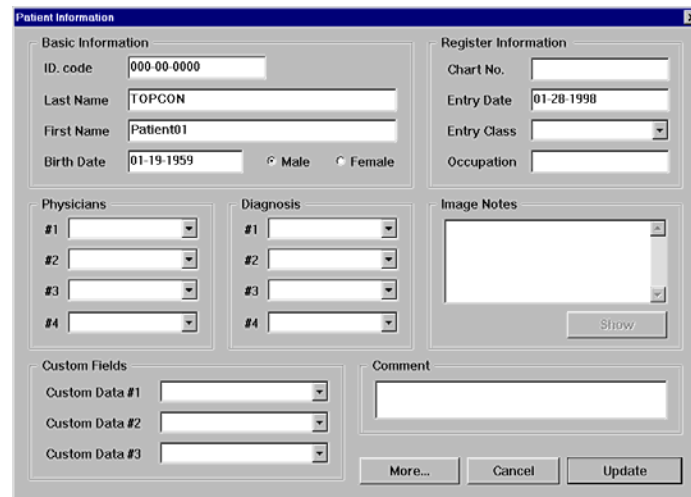
Figure 5-1 Save Image Dialog Box

Unlike other Windows applications, there is no edit box for specifying the file name in the above box. The image file name is decided by IMAGEnet automatically, and IMAGEnet will never overwrite an existing image file. Images displayed on the screen are always saved as new images. Since the proofsheets are not viable images, you cannot save only the proofsheets to a disk.

The patient ID code and the patient name can't be changed in this dialog box. To change patient information other than the patient ID code and the patient name, click the 'Patient...' button.

Patient Information to be Saved

IMAGEnet adds the patient information to the destination database or the INFOFILE on the drive if the patient is not registered. To change the patient information when saving, click the 'Patient...' button. The following dialog box will be displayed to allow modification.



The dialog box is titled "Patient Information" and contains several sections for data entry:

- Basic Information:** ID code (000-00-0000), Last Name (TOPCON), First Name (Patient01), Birth Date (01-19-1959), and gender (Male/Female).
- Register Information:** Chart No., Entry Date (01-28-1998), Entry Class (dropdown), and Occupation.
- Physicians:** Four dropdown menus labeled #1 through #4.
- Diagnosis:** Four dropdown menus labeled #1 through #4.
- Image Notes:** A text area with a "Show" button.
- Custom Fields:** Three dropdown menus labeled Custom Data #1, #2, and #3.
- Comment:** A text area.

At the bottom are buttons for "More...", "Cancel", and "Update".

Figure 5-2 Patient Information Dialog Box

After editing everything, click 'OK' to go back to the save image dialog box. If the patient is already registered in the database or the INFOFILE, IMAGenet updates the information with the contents of the above dialog box.

Chapter 6

Using Tools

Several useful tools can be applied to displayed images to enhance their view. IMAGEnet provides:

- Negative Image
- Expand Contrast (4 levels)
- Adjust Contrast/Color
- Box Enhancement (Enhance a ROI)
- Smooth Image (3 levels)
- Sharpen Image (3 levels)
- Mirror/Rotate Image (Mirror/Rotate/Flip)
- Add to 4UP, 9UP and 16UP
- Annotate Image
- Permanent Graphics
- Delete Graphics
- Zoom Image
- Undo

The above tools are run by choosing from the [Tools] menu. All, except for 'Zoom Image', are applied to the image in the active window immediately. 'Negative Image', 'Expand Contrast' and 'Adjust Contrast/Color' may also be run through the tool bar. A '*' mark is added to the end of the file name in the window title if any tool was applied to the image.

To undo the last tool applied to the image, choose 'Undo' from the [Tools] menu or click the undo icon on the tool bar. The undo buffer will be valid until the next tool is applied to an image, even if the active window has been changed. Undo only applies to the current active image window to which the last tool was applied.

Negative Image

This tool simply converts the image to negative.

Expand Contrast

This tool expands the contrast of the image. Three different levels of strength are provided to cover a variety of needs. If you need the maximum strength, choose 'Equalize' for the histogram equalization method.

Adjust Contrast

After choosing 'Adjust Contrast/Color...', either the 'Adjust Contrast' dialog box or the 'Adjust Color' dialog box is displayed according to the type of the image.

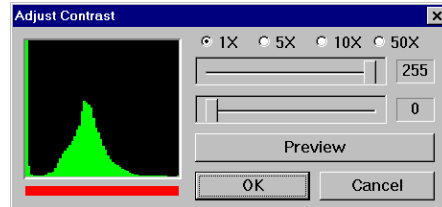


Figure 6-2 Adjust Contrast Dialog Box

The graph at the left displays the density histogram of the image. This histogram shows how the brightness of the image is distributed. Adjust the red bar just below the histogram to cover the most crowded portion of the histogram, which is usually a mountain shape. To check how contrast will be stretched before exiting, click 'Preview'. Click 'OK' to exit and stretch contrast of the image permanently.

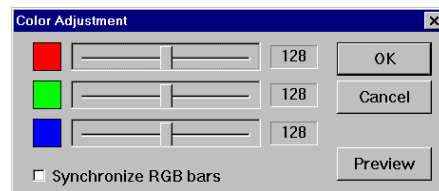


Figure 6-3 Adjust Color Dialog Box

The dialog box has 3 slide bars corresponding to red, green and blue. Adjust these bars to control intensity of each color. To check how color will be adjusted before exiting, click 'Preview'. Click 'OK' to exit and change color of the image permanently.

Box Enhancement

This tool enhances the contrast of a region of interest. Unlike 'Expand Contrast' and 'Adjust Contrast', this tool improves the contrast only within the region specified without affecting others. Since 'Box Enhancement' uses local image information in the region, the contrast is enhanced more strongly and efficiently.

After choosing 'Box Enhancement', the cursor will change to a cross-hair shape when it is moved to the active image window. First move the cursor to the upper left corner of the region of interest. Then click and drag the mouse until the guide rectangle completely covers the region of interest. When the mouse button is released, the contrast enhancement will be applied to the region.

Smooth Image

This tool applies an averaging filter to the image. Three different levels of strength are provided to cover a variety of needs.

Sharpen Image

This tool applies edge enhancement to the image. Three different levels of strength are provided to cover a variety of needs.

Mirror/Rotate Image (Mirror/Rotate/Flip)

These tools change the orientation of the current image. Three rotation schemes are available: Mirror, rotate, and flip.

Add to 4UP, 9UP and 16UP

These tools add the active image into a 4UP, a 9UP or a 16UP composite image window. If there is a composite image window that is not filled with the same type, the active image will be added there. If there is no composite image window or all composite image windows are filled up with the same type, a new composite image window is opened for the image. The 4UP, the 9UP and the 16UP composite image windows are maintained separately.

To add more than one image in a proofsheets to a composite, first click all the images, then choose 'Add to 4UP', 'Add to 9UP' or 'Add 16UP' from the [Tools] menu or click the 4UP icon, the 9UP icon or the 16UP icon on the tool bar.

Adding a proofsheets or a composite image to a composite image is prohibited.

Annotate Image

This tool puts the patient ID, the patient name, the captured date and the image label on the active image as a part of the image. This information is permanently written on the image as white text. This tool is quite useful when exporting images to other applications or bringing images to another computer. Annotating information on a proofsheets or a composite image is prohibited.

Permanent Graphics

To print an image with color graphics to a black and white printer, it may be desirable to convert the color graphics to white lines in order to see the graphics more clearly on the print. Exporting an image with color graphics to an application that does not support the DIB color palette is another use for this function.

Set the image window active, then choose 'Permanent Graphics' from the [Tools] menu. Color graphics on the image will be converted into white lines and will be permanently written to the image. If the image has analysis data related to the graphics, the analysis data will be deleted.

Delete Graphics

To delete color graphics on an image, set the image window active, then choose 'Delete Graphics' from the [Tools] menu. Color graphics on the image will be permanently deleted from the image. If the image has analysis data related to the graphics, the analysis data will also be deleted.

Zoom Image

Unlike other tools, 'Zoom Image' takes a different approach. To zoom up the image in the active window, click the center point of interest in the image using the mouse. IMAGEnet zooms up the image 2 times, locating the point in the middle of the window.

'Zoom Image' is not the real zoom operation. It replaces the original image with the enlarged image. Therefore, you cannot pan and scroll the zoomed image using the scroll bars. The original image is kept temporarily in the undo buffer. Call back the original image by choosing 'Undo' from the [Tools] menu or the undo icon on the tool bar.

Undo

To cancel tools applied to the active image, choose 'Undo' from the [Tools] menu or click the undo icon on the tool bar. This will undo the tool applied last to the image.

IMAGEnet saves the original image to the undo buffer before a tool is applied to the image. Since IMAGEnet has four undo buffers as the default configuration, it is possible to undo the last four tools applied. 'Undo' might not work sometimes because all image windows share the undo buffers. The original image may be already removed from the undo buffer.

The 'Add to 4UP', 'Add to 9UP' and 'Add to 16UP' can not be undone:

Chapter 7

Printing Images

IMAGENet allows printing of images displayed on the screen using a Windows printer. There are 4 menu items related to the print operation in the [File] menu.

- Print... Make a print of the active image window.
- Print preview Preview print on the screen.
- Print setup... Set up the Windows printer.
- Print template... Select a print template.

Except for the last item, 'Select template...', the dialog box of the above items are common to all Windows applications. However, some options in these dialog boxes may not be available or may be useless for IMAGENet.

7.1 Print Dialog Box

To make a print, make the image window that is to be printed active, then choose 'Print...' from the [File] menu or click the print icon on the tool bar. The following window is displayed to set print options.

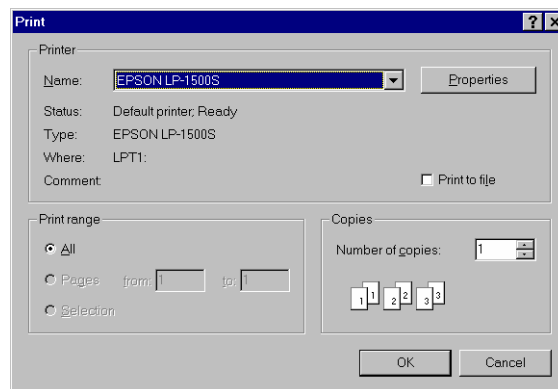


Figure 7-1 Print Dialog Box

Click 'OK' to start printing.

7.2 Print Preview Screen

To check how the image will be printed on the printing paper before making a print, choose 'Print preview' from the [File] menu.

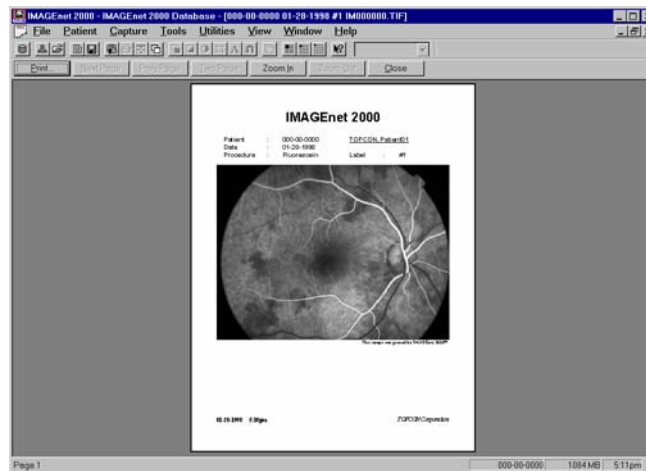


Figure 7-2 Print Preview Screen

7.3 Print Setup Dialog Box

The 'Print Setup' dialog box is used for changing the printer or paper to be used. If using a print template for printing the image, select the proper printer and the proper printing paper that the print template expects.

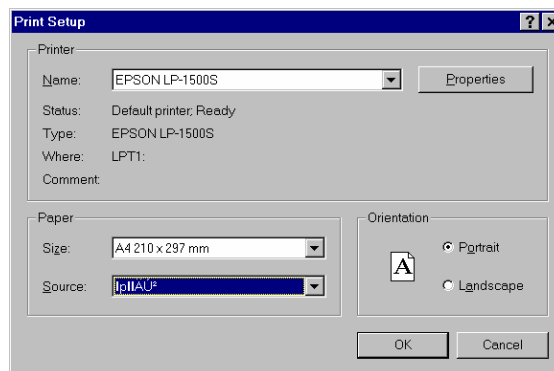


Figure 7-3 Print Setup Dialog Box

7.4 Selecting Print Template

The print template can customize the printout. Without the print template, the image is printed on a printing paper as large as possible. However, with the print template, the image can be put at almost any position and in any size on the printing paper. In addition, specific image information can be added to the printout. To select a print template, choose 'Select template...' from the [File] menu. The following dialog box will be displayed to select a print template to be used.

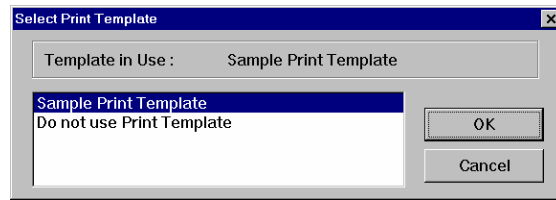


Figure 7-4 Select Print Template Dialog Box

Click desired print template, or 'Do not use Print Template', from the template list, then click 'OK'. A print template assumes a certain printer and a certain printing paper. Therefore, select the proper print template for the Windows printer and for the printing paper.

Using 'Do not use Print Template', to use any printer and printing paper. The image is always printed as large as possible on the printing paper.

See Appendix B for details of the print template.

7.5 Print Adjustment Panel

When printing a proofsheets or a composite using the precise print mode, the print adjustment panel will be displayed when choosing 'Print...' from the [File] menu or clicking the print icon on the tool bar. The print adjustment panel provides the ability to temporarily adjust brightness and contrast of each image in the proofsheets or the composite individually.

Adjustments made in the print adjustment panel are temporary. The original proofsheets or the original composite will never be changed. The graphic information is not displayed in the print adjustment panel.

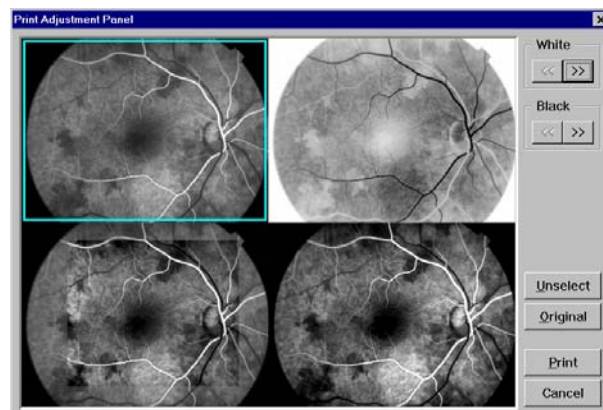


Figure 7-5 Print Adjustment Panel

At the time the adjustment panel is displayed, the adjustment mode is set to 'Whole', which means the whole proofsheets or the whole composite will be adjusted at once. The white level and the black level of the whole image can be adjusted using the arrow buttons at the upper right of the panel.

To adjust brightness and contrast of some particular images, click those images in the panel to mark them to be adjusted. Then adjust the white level and the black level using the arrow buttons at the upper right of the panel. The adjustment will only apply to the images marked.

To cancel the adjustment and return to the original condition, click the 'Original' button. To start printing, click the 'Print' button. The print adjustment panel disappears and the print dialog box is shown.

Notice

The print adjustment panel is displayed only when printing a proofsheets or a composite using the *precise print mode*.

Chapter 8

Using Utilities

8.1 Editing Proofsheets

Captured images saved as a proofsheets sometimes consist of 2 or more proofsheets, and the proofsheets sometimes contain unwanted images which are too dark or too bright. To edit such proofsheets, choose 'Edit Proofsheets...' from the [Utilities] menu. The 'Select Patient' dialog box will be displayed first. Select a patient using the method described in "4.2 Selecting Patient", then click 'OK'. This will show the "Select Proofsheets" dialog box similar to the one described in "4.3 Selecting Image". In this dialog box, select proofsheets to edit from the image list, then click 'OK'. Two or more proofsheets may be selected, but all must have the same procedure name and the same capture date.

After selecting the proofsheets to be edited, an edit window is displayed on the screen. The edit window looks like another image window, but it has a control dialog bar at the bottom. The control dialog bar allows editing the image label of the proofsheets and the individual images. All proofsheets are merged and are reconstructed once. If there are several empty spots left in the first proofsheets, images in the second proofsheets are moved there to fill up the first proofsheets.

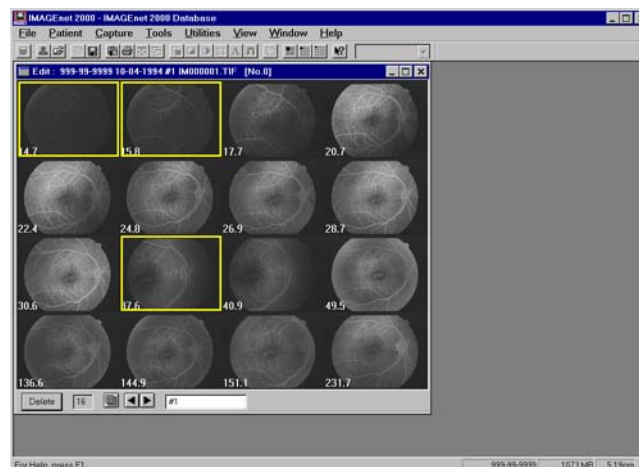


Figure 8-1 Proofsheets Edit Window

Viewing Images

At the time when the edit window is opened, the proofsheets display mode is active. To display any other proofsheets using the left arrow button and the right arrow button on the control dialog bar. These buttons change the displayed proofsheets to the one before (previous) and the one after (next).

To view an individual image, click the Proofsheets icon on the control dialog bar. This will change the display mode of the edit window to the normal display mode. While in the normal display mode, the left arrow button and the right arrow button work for changing the image to be displayed. To go back to the proofsheets display mode, just click the proofsheets icon again. Directly double click the image in the proofsheets to display it.

Deleting Images

Delete an image that is being displayed in the edit window anytime by clicking the 'Delete' button on the control dialog bar.

If in the proofsheets display mode, click the images to delete first using the mouse. The clicked images are framed by a yellow line to show them as marked. It is possible to change the proofsheets while marking images to be deleted. Then click the 'Delete' button on the control dialog bar. All the images marked will be deleted.

After deleting an image, proofsheets will be reconstructed to reflect the change.

Saving Edited Proofsheets

To save edited proofsheets, choose 'Save...' from the [File] menu, or click the save icon on the tool bar. The edited proofsheets are immediately saved to the original location.

Working with the Edit Window

To cancel the editing, choose 'Close' from the [File] menu or use the system menu of the capture window. Access the system menu of the window by clicking the square at the upper left corner, the left end of the title of the window. All deleted images are recovered and all the tools applied to individual images are canceled.

Since the edit window is quite similar to the *normal* image window, it may be treated as a normal image window in most cases. Most tools in the [Tool] menu, printing, or even displaying an image from a proofsheets displayed in the edit window can be done just like in a normal image window. Results of applied tools are directly reflected to the proofsheets.

8.2 Copying/Deleting Images

To copy images from one database to another, or to copy images on the system hard disk to an archive disk, or to delete images in a database, choose 'Copy/Delete Images...' from the [Utilities] menu. This will show the following dialog box.

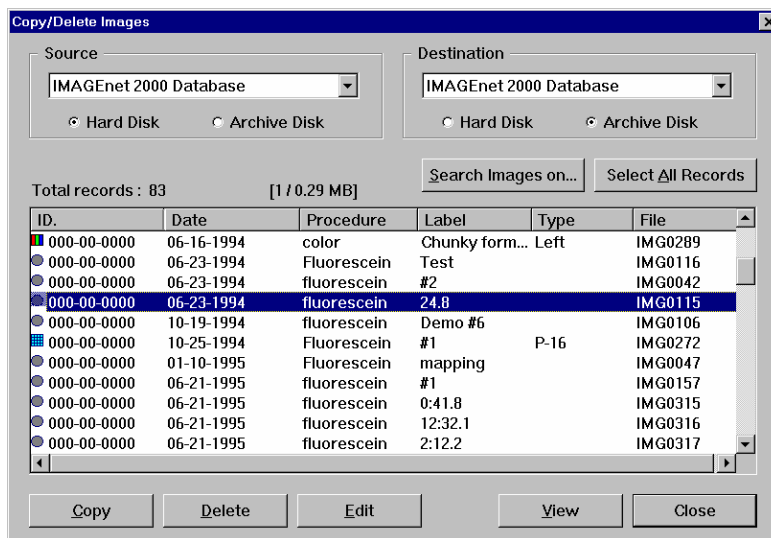


Figure 8-2 Copy/Delete Images Dialog Box

Viewing Images

To view an image before copying or deleting, select an image or a proofsheets, then click the 'View' button. If the image is a proofsheets, double click on an image in the proofsheets directly to view the image.

Copying Images

Select the source database or storage drive from the 'Source' drop down list. Choose either 'Hard Disk' or 'Archive Disk' if necessary. Mount the archive disk if choosing 'Archive Disk'. All the images in the selected disk of the database will be shown in the image list box.

Select the destination database or storage drive from the 'Destination' drop down list. Choose either 'Hard Disk' or 'Archive Disk' if necessary.

From the image list, select images and proofsheets to copy to the destination. Then click the 'Copy' button to start copying the images.

Deleting Images

Select the source database or storage drive from the 'Source' drop down list. Choose either 'Hard Disk' or 'Archive Disk' if necessary. Mount the archive disk if choosing 'Archive Disk'. All the images in the selected disk of the database will be shown in the image list box.

From the image list, select images and proofsheets to delete from the source database. Then click the 'Delete' button to start deleting the images. A confirmation dialog box is displayed before the images are actually deleted.

Editing Image Information

Select the source database or storage drive from the 'Source' drop down list. Choose either 'Hard Disk' or 'Archive Disk' if necessary. Mount the archive disk if choosing 'Archive Disk'. All the images in the selected disk of the database will be shown in the image list box.

From the image list, select an image or a proofsheet to edit the image information, or double click the image record in the image list.

After selecting an individual image, the following dialog box will be displayed for editing the image information.

The dialog box titled "Editing Image Information : <IMG0115>" contains the following fields and controls:

- ID. Code: 000-00-0000
- Name: Patient-01, TOPCON
- Procedure: fluorescein (dropdown menu)
- Eye: ☒ Right ☐ Left
- Date: 06-23-1994 (dropdown menu)
- Angle: 50.0
- Label: 24.8
- Scale Factor: 0.27 (1:4)
- Remark: (text field)
- Buttons: OK, Cancel, Note...

Figure 8-3 Edit Image Information Dialog Box

Click 'OK' when you have made necessary changes.

After selecting a proofsheet, the following dialog box will be displayed for editing the image information.

The dialog box titled "Editing Image Information : <IMG0010>" contains the following fields and controls:

- ID. Code: 000-00-0000
- Name: Patient-01, TOPCON
- Procedure: fluorescein (dropdown menu)
- Date: 01-06-1989 (dropdown menu)
- Label: PROOFSHEET
- Table of image information:

#01	—	50.0	Demo #1
#02	—	50.0	Demo #2
#03	—	50.0	Demo #3
#04	—	50.0	Demo #4
#05	—	50.0	Demo #5

- Remark: (text field)
- Buttons: OK, Cancel, Note...

Figure 8-4 Edit Proofsheets Information Dialog Box

Click 'OK' when you have made necessary changes.

8.3 Checking Database Files

If having trouble accessing a system database, choose 'Check Database Files' from the [Utilities] menu. IMAGEnet scans the patient database files and the image database files, and tries to fix problems if any are found. Since this function sometimes takes a long time, it should not be run often.

8.4 Showing Archive Disk Information

To check the contents of an archive disk, choose 'Show Archive Disk Information' from the [Utilities] menu. This will show information about the archive disk currently mounted in the drive.

8.5 Initializing Archive Disk

Before using a new archive disk, it needs to be initialized as an archive disk using IMAGEnet. To initialize a new archive disk, choose 'Initialize Archive Disk' from the [Utilities] menu.

Mount the new archive disk. IMAGEnet assigns a new disk number to the disk, and creates necessary directories and files on the disk. The disk number assigned to the disk will be reported when the initialization has completed.

8.6 Importing an Image from a File

To import an image from a disk file, choose 'Import Image...' from the [Utilities] menu. This will show the following dialog box to specify a file or to browse the disk. Type or select the image file, then click 'OK'. The imported image will be displayed in a new image window.

Import of images can be done from a TIF file, a BMP file, a JPEG (.JPG) file or DICOM (.DCM) file. The image types that can be imported to IMAGEnet are:

- TIF 8-bit gray scale and 24-bit color
- BMP 8-bit gray scale, 24-bit color and 8-bit palette color
- JPEG 8-bit gray scale, 24-bit color
- DICOM 8-bit gray scale or 24-bit color (non-compressed format)

The Digital Imaging and Communications in Medicine (DICOM) is a standard for the communication of medical images and associated information. The file format saved by the import/export function uses the specification for Visible Light Image for Photography, DRAFT STANDARD FOR TRIAL USE .

The BMP 8-bit palette color image is converted into the 24-bit color image. In addition, all the image files created by DOS IMAGEnet systems may be imported.

8.7 Exporting an Image to a File

To export an image to a disk file, activate the image window first by clicking anywhere on the window or using several click actions of the right mouse button, then choose 'Export Image...' from the [Utilities] menu. This will show the following dialog box to specify a file to browse the disk. Type or select the image file, then click 'OK'. The active image will be exported to the disk file. If an existing image file was selected, that file will be overwritten.

Export of an image can be done as a TIF file, a BMP file, a JPEG (.JPG) file or DICOM (.DCM) file. The images are exported in the following file format:

- TIF 8-bit gray scale or 24-bit color
- BMP 8-bit gray scale or 24-bit color
- JPEG 8-bit gray scale or 24-bit color
- DICOM 8-bit gray scale or 24-bit color (non-compressed format)

The Digital Imaging and Communications in Medicine (DICOM) is a standard for the communication of medical images and associated information. The file format saved by the import/export function uses the specification for Visible Light Image for Photography, DRAFT STANDARD FOR TRIAL USE .

If JPEG is chosen, a dialog box which asks the image quality will be displayed. Choose a quality for the saved image. The higher the image quality is, the bigger the file size becomes. 'High' is the best for most cases, it provides a good balance of image quality and file size.

8.8 Quick Draw

Starting the Quick Draw Utility

In IMAGEnet, display an original image, then select the 'Quick Draw' command from the 'Utilities' menu to start the Quick Draw Utility. (A composite image must be saved and reloaded prior to starting the Quick Draw Utility.) The image window must be active when the command is selected. When the Quick Draw Utility is started, the following dialog box will be displayed with the original image displayed in the dialog box. This dialog box consists of the image window, 12 icons, and 8 color radio buttons.

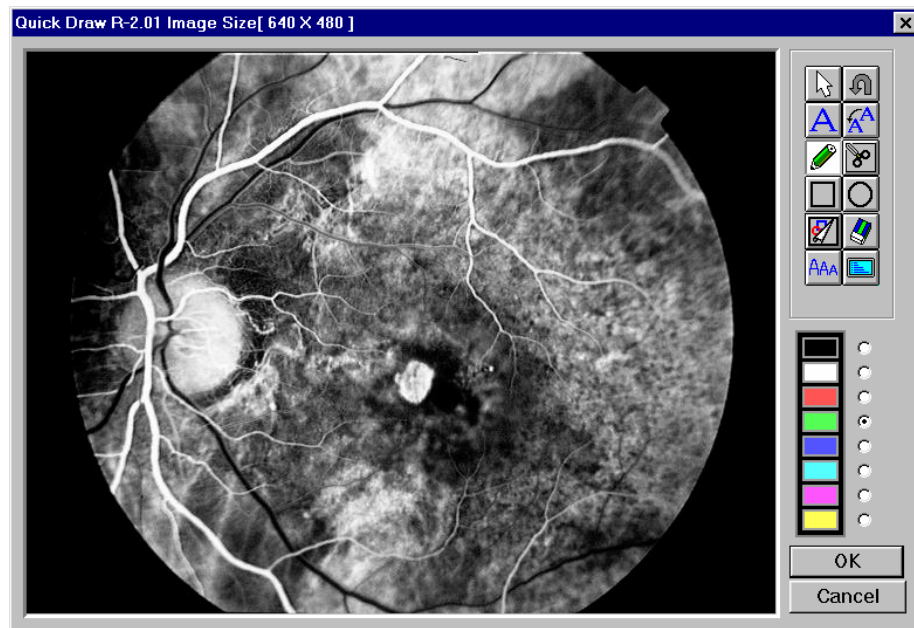


Figure 8-5 Quick Draw Dialog Box

Drawing

Icons to be used for drawing

To draw graphics, use the following icons located at the right of the image window. The mouse cursor will be changed according to the draw icon chosen. All drawing can only be done on the image. Once an icon has been chosen, move the cursor to the image window. To cancel the drawing of a line, a rectangle and an ellipse, click the right button before releasing the left button.



Select where an arrow should appear. To change the direction, click the right button. The arrow's size depends on font's size.



Select where a string of text should begin.



To move text, use this function. Also text can be moved by pressing and holding the mouse button. The text will follow the movement of the mouse until the mouse button is released.



Select the starting and ending points of a line (area or continuous line or straight line).



To carry out trimming, select the starting and ending points of a trimming area by pressing and holding the mouse button.



To draw a rectangle (outline or mesh or filling), use this function.



To draw an ellipse or a circle (outline or mesh or filling), use this function.

Icons to be used for changing font, line, and arrow styles

To change the font, line, and arrow styles, use the following icons located at the right of the image window.



To change *font size*, *style*, and *name*, use this function.



To change *pen width*, *filling*, *line style*, and *mesh style*, use this function.

- PEN WIDTH solid, dash and dot
- FILLING outline, mesh and brush
- LINE STYLE area, scribble and line
- MESH STYLE horizontal mesh, vertical mesh, downward mesh, upward mesh, horizontal and vertical mesh and crossmesh

Icons to be used for deleting the drawing

To delete the graphics, use the following icons located at the right of the image window.



To delete the last operation, use this function.



To delete all graphics in the window, use this function. Graphics on the original image can *not* be deleted.

Icons to change display mode

To toggle the graphics on/off, use the following icon located at the right of the image window.



This function is enabled only when the icon is pressed. The drawing will be hidden in order to get a better view of the image underneath. But the graphics

on the original image can *not* be hidden. The drawing will return when the icon is released.

Example Image

The following image is an example of a drawn image window.

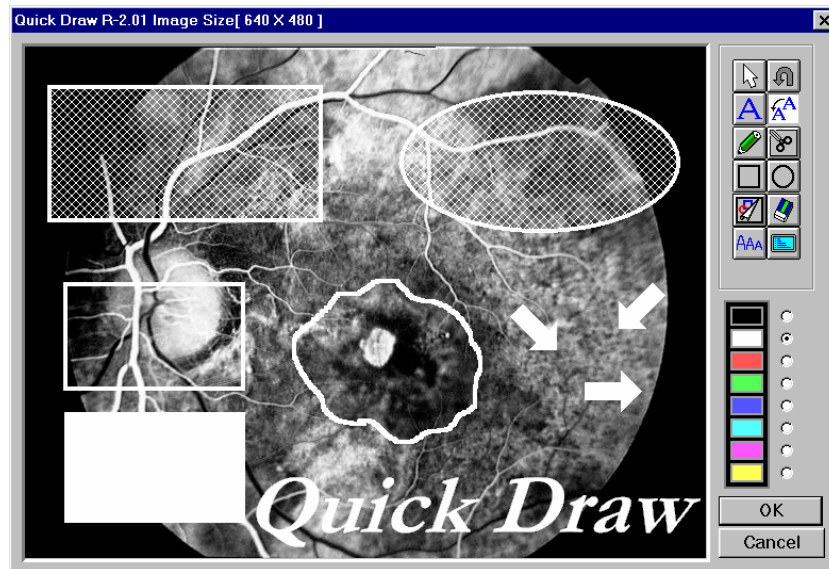


Figure 8-6 Final Drawn Image

Exiting the Quick Draw Utility

To exit the Quick Draw Utility, click the Close button. The original image in the IMAGENet window will be replaced by the drawn image.

Printing Drawn Image

The Quick Draw Utility does *not* print the drawn image. Return to IMAGENet, then use the 'Print' command in the 'File' menu of IMAGENet.

Saving Drawn Image

The Quick Draw Utility does *not* save the drawn image either to the hard disk or to an archive disk. Returning to IMAGENet, then use the 'Save' command in the 'File' menu to save the drawn image to any disk. The drawn image saved to a disk may be displayed at a later time.

8.9 Transferring Image to Clipboard

As a way to share the image data among Windows applications, IMAGEnet provides a feature to transfer image data to the Clipboard. To do this, first set the image window active you want to copy, then choose 'Transfer to Clipboard' from the [Utilities] menu or click the clipboard icon on the tool bar.

Image data will be copied to the Clipboard as a DIB (Device Independent Bitmap) including graphics information on the image if it exists. Most Windows applications should be able to 'paste' the image to their document.

8.10 Measure and Compare

IMAGEnet provides two quantitative analysis functions: Measure and Compare. Both of these functions become available on the [Utilities] menu whenever a single image is displayed in the active window. The two functions are disabled when a proofsheets, composite, or an acquisition window is active.

8.10.1 Measure

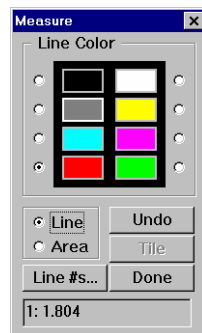


Figure 8-7 Measure Dialog Box

The Measure function allows the drawing of lines and areas anywhere on the image. To choose a color, click on one of the circles to the left or right of one of the eight colors, or click one of the color boxes directly (default is green). Similarly, click on either line or area (default is area). Move the mouse to the point at which to start the line or area, press the left button, and move the mouse (holding the left button down.) When the line or area is done, release the left button. The measurement will be printed in the upper left (line) or right (area) of the image. (The measurements will only be visible if this portion of the image is visible in the window.)

To remove the last measurement drawn during the current measure session, press the 'Undo' button. This is a one-level undo. This will not affect measurements drawn in any previous measure sessions. (To remove all measurements for the current session, choose

Undo from the [Tools] menu. To remove all graphics on the image, choose Delete Graphics from the [Tools] menu.)

The right mouse button may be used to move to the next window. If the next window is not a single image, the Measure dialog box will temporarily be hidden. Continue clicking the right button until a single image is displayed. The Measure dialog box will reappear, and measurement may continue.

The 'Tile' button is only in effect during a Compare session, and will rearrange the images being compared into their original, tiled version. (This can be used to restore a maximized image to its original position.)

If an image has 'burned in graphics' (in IMAGEnet, this can be done by choosing 'Make graphics permanent'), the measure function will not detect any previous graphics. Thus, if an image already has one line measurement burned in, the Measure function will simply overwrite that measurement with the next line drawn. To prevent this, use the 'Line #s' button to reset the labeling. In this particular case, set "Start line at" to 2.

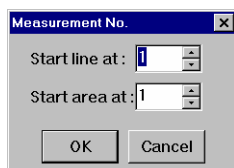


Figure 8-8 Reset Line and Area label numbers

8.10.2 Compare

Up to four single images may be compared during a single compare session. (At least 2 are necessary for the function to run.) With a single image displayed in the active window, choose Compare from the [Utilities] menu. If only 2 single images have been loaded into memory, the function will go directly to the Align Images dialog box. If more than 2 images have been loaded, a Select Images dialog box will be displayed.

Use the left mouse button to choose (and unchoose) the 2, 3, or 4 images to be compared. If less than 5 images have been loaded, the 'Select All' button may be used to select all the images at once. If more than 16 images have been loaded into memory, use the '>>' (up) and '<<' (down) buttons to move through the pages. Choose 'OK' to continue finish choosing the images.

The images chosen for comparison will be displayed in a tiled format for alignment and mapping. Before the images can be mapped, they must be aligned to match each other. IMAGEnet uses a transformation which requires at least 3 sets of corresponding points. Points should be entered progressively on each image (i.e. point 1 on image #1, point 1 on image #2, point 1 on image #3, point 1 on image #4, point 2 on image #1, etc...). Use

obvious points such as vessel crossings as often as possible. The transformation works best if the points surround the area of interest in a triangular pattern.

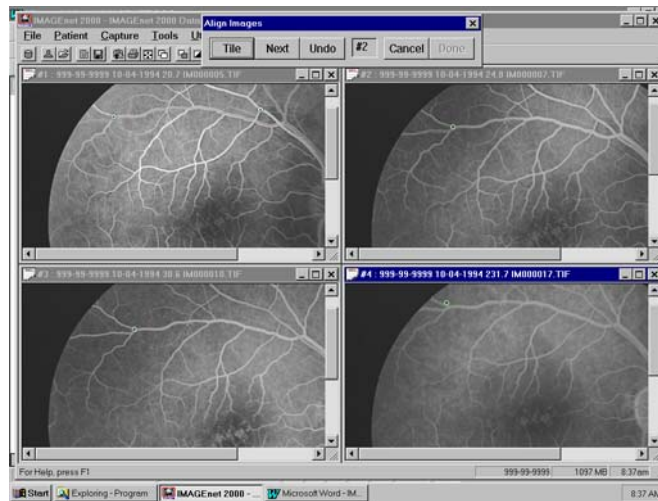


Figure 8-9 Alignment Function

To view the image better, click on the Maximize button (upper right corner of window). Use the 'Next' button on the Align Images dialog box to go to the next image. (Using the right mouse button will have the same effect, but will go through ALL single open images, not just those that are being compared.) Use the minimize button (upper right corner) or the 'Tile' button on the Align Images dialog box to return to the tiled display format.

To magnify the image before entering a point, double click the center point of interest in the image using the left mouse button. The image will be magnified until an alignment point is entered. Pressing the right mouse button before a point is entered will cancel the zoom and return the image to regular magnification.

If all the images to be compared are of similar size and are at similar positions in the image window, scrolling all the images at once may be convenient. To scroll all the image windows to be synchronized, scroll horizontally or vertically any of these image windows by holding the Ctrl key down. The synchronized scrolling only affects on the images to be compared.

When at least 3 sets of points have been entered, press 'Done'. The transformation will be calculated for each image in relation to the others.

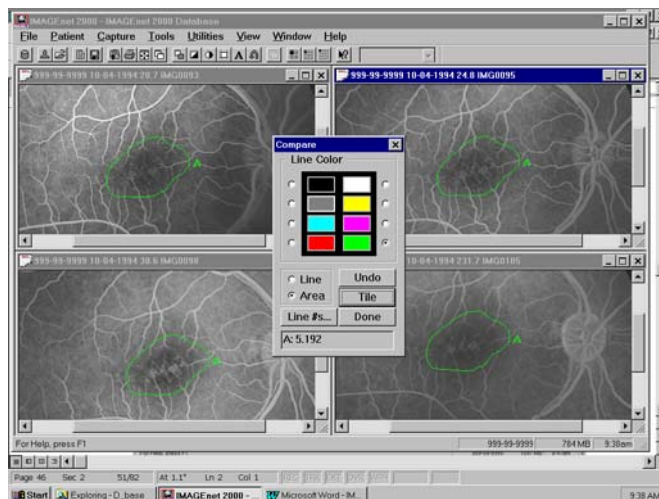


Figure 8-10 Compare Function

If any of the images contain graphics, a warning box will appear, at which time all graphics can be deleted. If graphics are not deleted, the user should be warned that measurement labels (1-8 for lines, and A-H for areas) may not match among the images. For instance, if image 2 already contains 3 lines, the labeling will begin with '4' for the next line, while the corresponding line will be labeled with '1' on the other images. If it is desired to have all corresponding measurements have the same label, use the 'Line #s' button to reset each of the other image labels. ('Line #s' only applies to the currently active window. To change more than one starting label, activate each of the images individually, clicking 'Line #s' for each one.)

The Compare function uses the same dialog box as the Measure function (see 8.9.1 Measure for explanation of buttons.) Any image can be measured. The corresponding measurement is simultaneously drawn on all comparison images. The 'Undo' button will undo the last measurement in all of the comparison images. The image windows to be mapped may be scrolled simultaneously by holding down the Ctrl key while scrolling.

If an image is displayed that is not one of the comparison images (i.e. by using the Right mouse button), the Compare dialog box will be hidden until a comparison image is again displayed.

When done mapping, press 'Done'. As the last option of the Compare function, IMAGEnet asks if the image subtraction should be performed. If 'No' is chosen, the Compare function will end here.

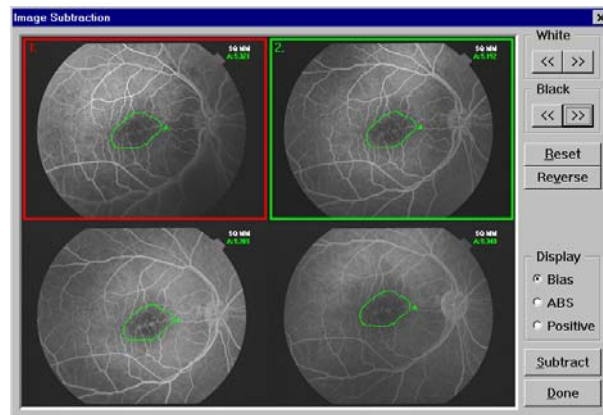


Figure 8-11 Image Subtraction Dialog Box

The images to be subtracted are displayed in an Image Subtraction dialog box with 2x2 layout. Subtraction is performed between 2 selected images at a time. First choose the base image from which the other image will be subtracted by clicking the image directly. At this point adjust the white level and the black level using the arrow buttons at the upper right of the dialog box. The adjustment will only apply to the base image. Then choose the other image, and adjust the white level and the black level in the same manner. To obtain the subtracted result between the 2 images, click the 'Subtract' button. The second image will be subtracted from the first image.

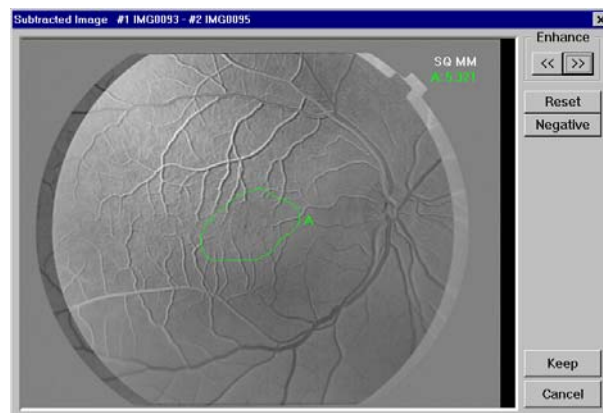


Figure 8-12 Subtracted Image Dialog Box

The result of subtraction will be displayed in a Subtracted Image dialog box as an image. If both images are B/W, the result image will be B/W. If both images are color, the result image will be color. If one image is B/W and the other image is color, only the green plane of the color image will be used for the calculation, then the result image will become B/W.

The contrast of the result image may be enhanced using the arrow buttons at the upper right of the dialog box. Click the Keep button to create a new image window for the result image. Click Cancel to go back to the Image Subtraction dialog box.

Chapter 9

Managing Patients

9.1 Accessing Patient Information

To access the patient information, choose 'Select Patient...' from the [Patient] menu, or click the patient icon on the tool bar. The Patient dialog box (shown in Figure 4.2) will be displayed to select a patient. Select a patient from the patient list, then click the 'Information' button in the dialog box. The following dialog box will be displayed.

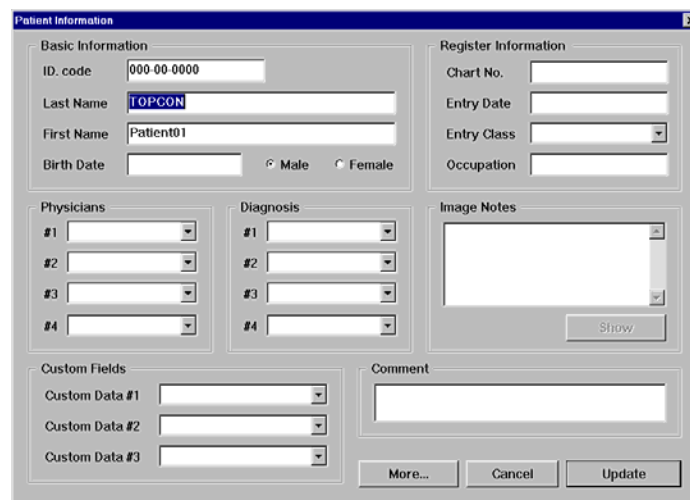
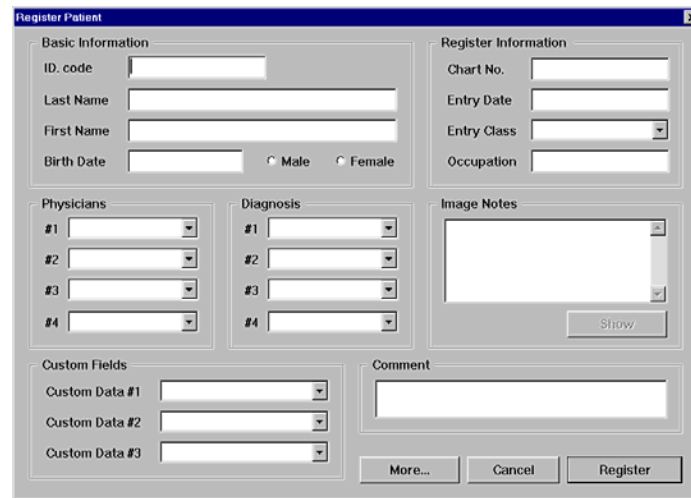
The image shows a 'Patient Information' dialog box with a title bar and a close button. It is divided into several sections: 'Basic Information' with fields for ID code (000 00 0000), Last Name (TOPCON), First Name (Patient01), Birth Date, and gender (Male/Female); 'Register Information' with fields for Chart No., Entry Date, Entry Class, and Occupation; 'Physicians' with four dropdown menus (#1-#4); 'Diagnosis' with four dropdown menus (#1-#4); 'Image Notes' with a text area and a 'Show' button; 'Custom Fields' with three dropdown menus (Custom Data #1-#3); and a 'Comment' text area. At the bottom are 'More...', 'Cancel', and 'Update' buttons.

Figure 9-1 Patient Information Dialog Box

To update the information in this dialog box, type new data to any data field to update, then click the 'Update' button. The patient information will be updated and the dialog box will be closed. To not change anything, click 'Close' to skip updating the patient information.

9.2 Registering New Patients

To register patients without doing capture, choose 'Register Patient...' from the [Patient] menu. This will show the following dialog box to register a new patient.



The 'Register Patient' dialog box is divided into several sections. The 'Basic Information' section includes fields for ID code, Last Name, First Name, Birth Date, and gender (Male/Female). The 'Register Information' section includes Chart No., Entry Date, Entry Class (a dropdown), and Occupation. The 'Physicians' section has four dropdown menus labeled #1 through #4. The 'Diagnosis' section also has four dropdown menus labeled #1 through #4. The 'Image Notes' section features a large text area and a 'Show' button. The 'Custom Fields' section contains three dropdown menus for Custom Data #1, #2, and #3. A 'Comment' section has a text area. At the bottom are 'More...', 'Cancel', and 'Register' buttons.

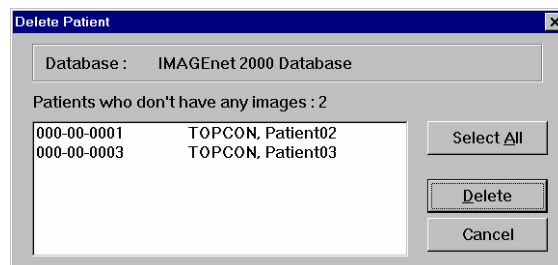
Figure 9-2 Patient Registration Dialog Box

Fill the patient information fields in the dialog box, then click the 'Register' button to register it. At least the patient ID. code and the patient name must be specified. Other information field may be left blank if it's not available at the time. Fields may be changed later.

After the patient is registered, the patient information fields are all cleared and ready for registering another patient. To recall the patient information just registered, click the 'Recall' button. To exit the dialog box, click 'Close'.

9.3 Deleting Patients

To delete patients who do not have images in the database, choose 'Delete Patient...' from the [Patient] menu. IMAGEnet checks the database, then displays the following dialog box.



The 'Delete Patient' dialog box shows the 'Database' as 'IMAGEnet 2000 Database'. It lists 'Patients who don't have any images : 2'. The list contains two entries: '000-00-0001 TOPCON, Patient02' and '000-00-0003 TOPCON, Patient03'. To the right of the list are three buttons: 'Select All', 'Delete', and 'Cancel'.

Figure 9-3 Delete Patient Dialog Box

Select patients to delete from the patient list in the dialog box. To select all of them, click the 'Select All' button. Then click the 'Delete' button to start deleting the selected

patients. IMAGEnet asks for confirmation before deleting the patients from the database permanently. Cancel the operation by clicking 'Cancel' in any step.

It isn't possible to delete patients who have images in the database.

Chapter 10

Exchanging Images

10.1 Preparation

IMAGEnet supports exchanging images using E-mail. This E-mail is called the image exchange mail. IMAGEnet creates mail with an image attachment and automatically pass the mail to Microsoft Exchange. IMAGEnet also retrieves such E-mail and directly imports the attached image with the patient and image information.

To use these functions in IMAGEnet, at least one information service for Microsoft Exchange such as Microsoft FAX and Internet Mail must be setup properly. To setup these information services for Microsoft Exchange, please refer to the corresponding user's manuals. In addition, recipients must be entered to the address book of Microsoft Exchange prior to sending an image. IMAGEnet does not have a function for that.

Using Microsoft FAX and a modem is the easiest and the cheapest way to do this. Simply, install Microsoft FAX from Windows 95 CD. Only restriction in this case is that recipient must also use Microsoft FAX to receive the attached image correctly.

If a profile for Microsoft Exchange is not defined by the IMAGEnet configuration program, the following dialog box will be displayed to choose a profile.

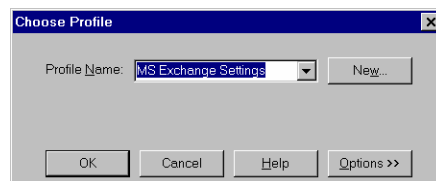


Figure 10-1 Choose Profile Dialog Box

If recipient is not an IMAGEnet user, any mail software can be used to read the mail and to get the attachment, because the image exchange mail is just a regular E-mail.

10.2 Sending Image by Mail

To send an image by E-mail, activate the image window first by clicking anywhere on the window or using several click actions of the right mouse button. Then choose 'Send Image...' from the [File] menu. The following dialog box will be displayed to choose the recipient and image quality of the attached image.

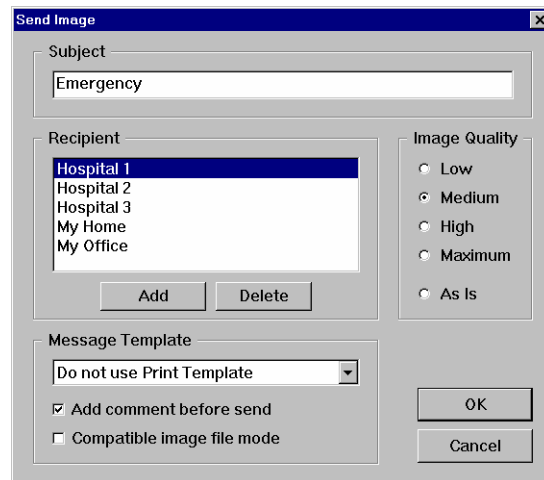


Figure 10-2 Send Image Dialog Box

Type the subject of the image (or the mail), choose a recipient and image quality, then click 'OK'. If the 'Add comment before send' check box is checked in the Send Image dialog box, the following dialog box will be displayed to add or edit the mail.

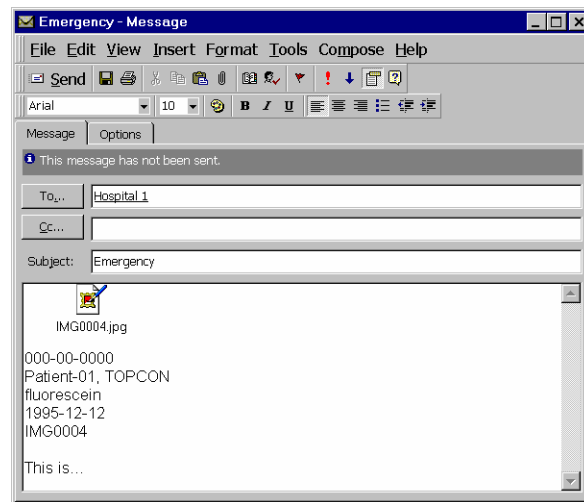


Figure 10-3 Message Dialog Box

10.3 Retrieving Images in E-mail

To retrieve images in received E-mail, choose 'Retrieve Mail...' from the [File] menu. The following dialog box will be displayed to select the E-mail received at that moment.



Figure 10-4 Retrieve Mail Dialog Box

Choose one from the list, then click 'Open' to open the mail. Click 'Attachment' to view the attached image, or click 'Import' to directly import the attached image to IMAGEnet.

If the mail is opened, the following dialog box will be displayed. Click 'View' to view the attached image, or click 'Import' to directly import the attached image to IMAGEnet.

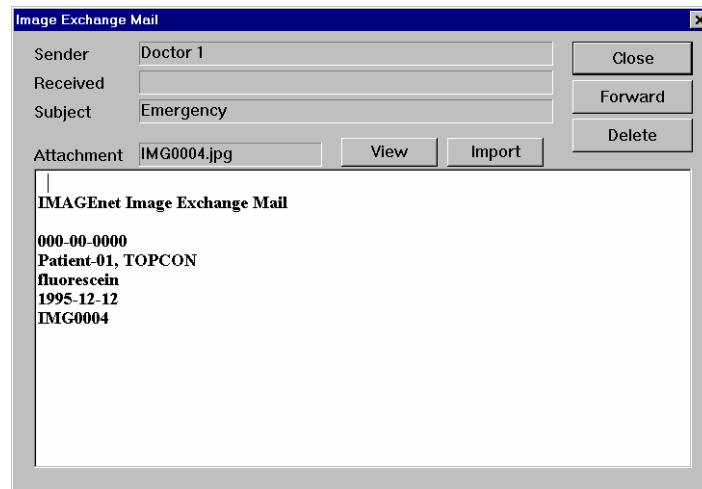


Figure 10-5 Image Exchange Mail Dialog Box

Chapter 11

Setting Options

To change IMAGENet options, choose 'Options...' from the [Utilities] menu. The Options property sheet that contains 4 tabs will be displayed to set various options. Options are categorized into 4 tabs. To change these tabs, simply click the tab at the top of the property sheet.

11.1 General Options

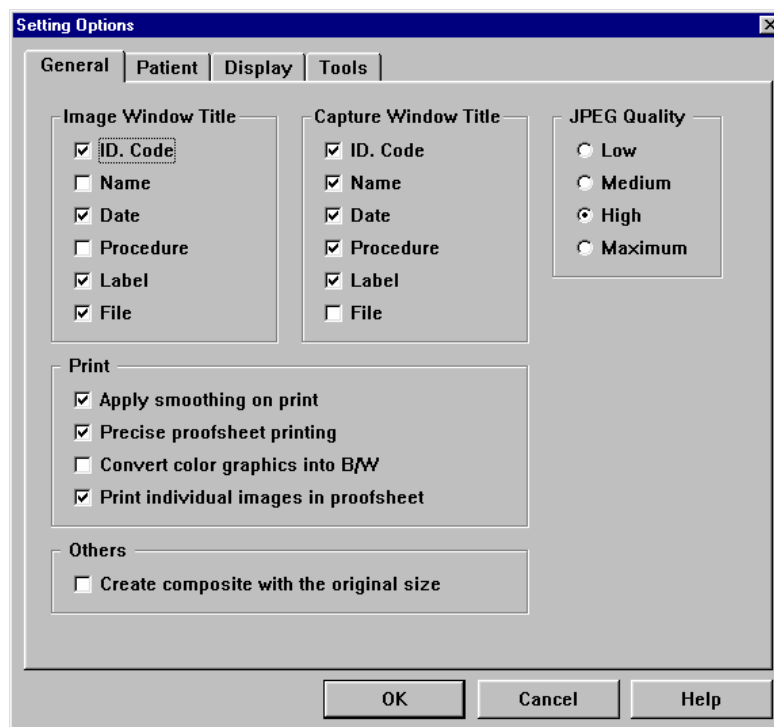


Figure 11-1 General Options Tab

Image Window Title

Choose items to be shown on the image window title.

Capture Window Title

Choose items to be shown on the capture window title.

JPEG Quality

Choose the JPEG encode level for JPEG image files.

Print

Set the following print options:

Apply smoothing on print

Performs the smooth scaling on printing images.

Precise proofsheets printing

Performs the precise printing on proofsheets image printing

Convert color graphics into B/W

Convert color graphics to B/W graphics on printing.

Print Individual Images in Proofsheets

Make individual prints of selected images.

Others***Create Composite with the original size***

When selected, composite is made with actual image size.

11.2 Patient Options

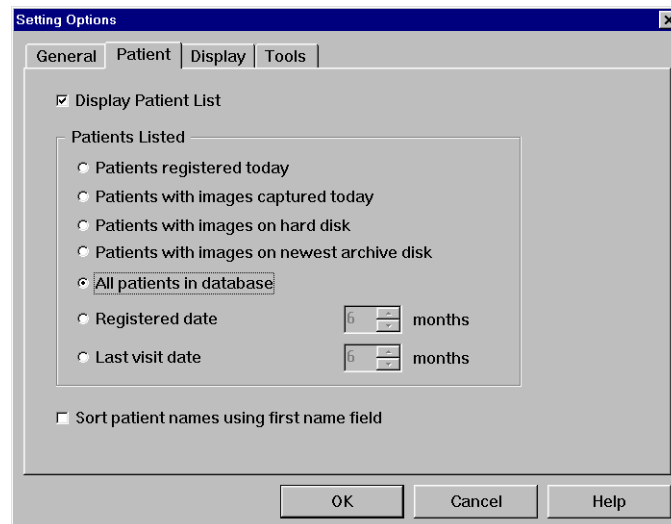


Figure 11-2 Patient Options Tab

[Display patient list] check box

Displays the patient list on the patient selection.

Patients Listed

Choose a range of patients to be included in the patient list.

[Sort patient names using first name field] check box

Sort patient names using first name field when the patient list is sort by name.

11.3 Display Options

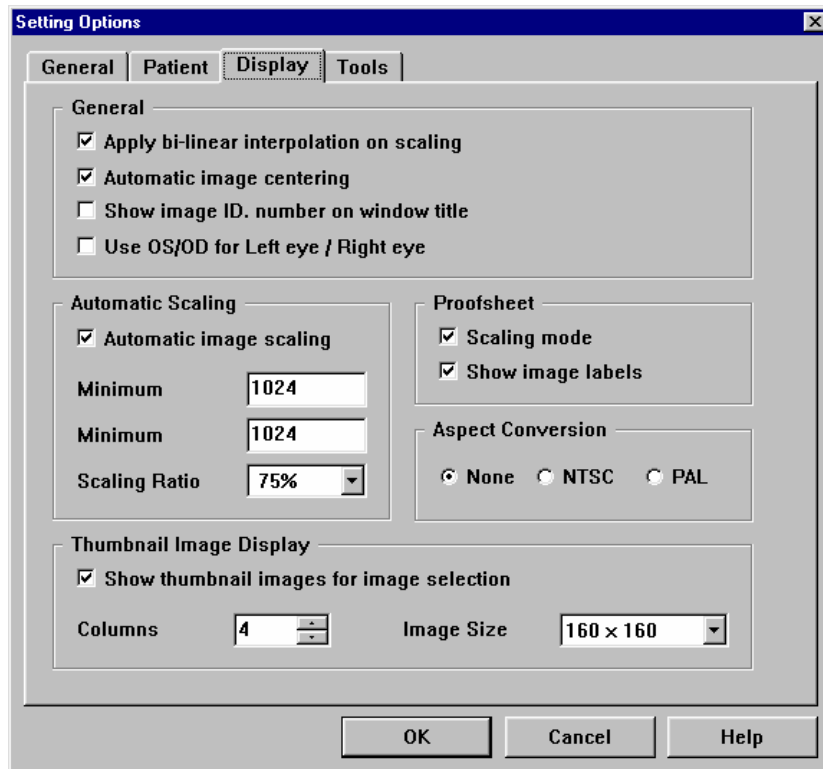


Figure 11-3 Display Options Tab

General

Set the following display options:

Apply bilinear interpolation on scaling

Performs bilinear interpolation when an image is scaled.

Automatic image centering

Performs automatic image centering for the image window. Whenever the size of the image window is changed, the scroll position of the image window will be automatically adjusted so the center of the image is always visible.

Show image ID. number on window title

Displays the image ID. number on the window tile.

Use OS/OD for Left eye / Right eye

Displays OD/OS for Left eye/Right eye.

Automatic Image Scaling

Set the following automatic scaling options:

Automatic image scaling

Performs automatic display scaling.

Minimum Width

Threshold image width.

Minimum Height

Threshold image height.

Scaling Ratio

Scaling ratio (%).

If the scaling ratio is less than 100% , only the images bigger than the threshold width and height will be scaled (reduced) automatically. If the scaling ratio is greater than 100% , only the images smaller than the threshold width and height will be scaled (enlarged) automatically.

Proofsheet

Set the following proofsheet display options:

Scaling mode

Displays a proofsheet in the scaling mode.

Show image label

Displays the image label of each image in the proofsheet on the screen.

Aspect Conversion

Choose the aspect ratio conversion mode for 512x512 images saved by IMAGENet-X:

None

Do not perform the aspect ratio conversion.

NTSC

Convert aspect ratio assuming the original image is NTSC.

PAL

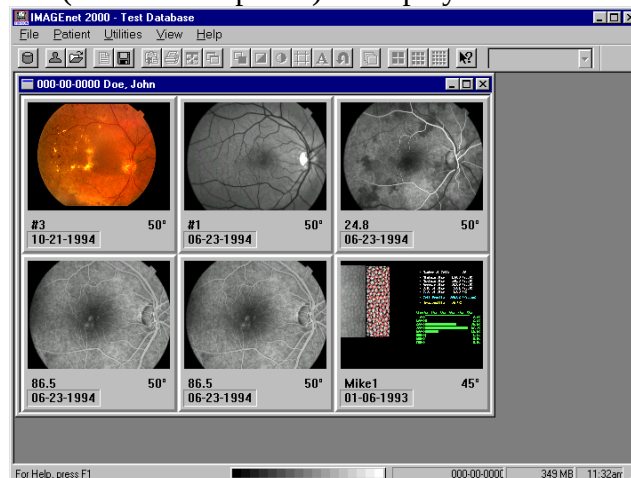
Convert aspect ratio assuming the original image is PAL.

Thumbnail Image Display**Show thumbnail images for selection**

Switch between thumbnail display and record list.

Columns / Image Size

Format and size (measured in pixels) of displayed thumbnails.



11.4 Tools Options

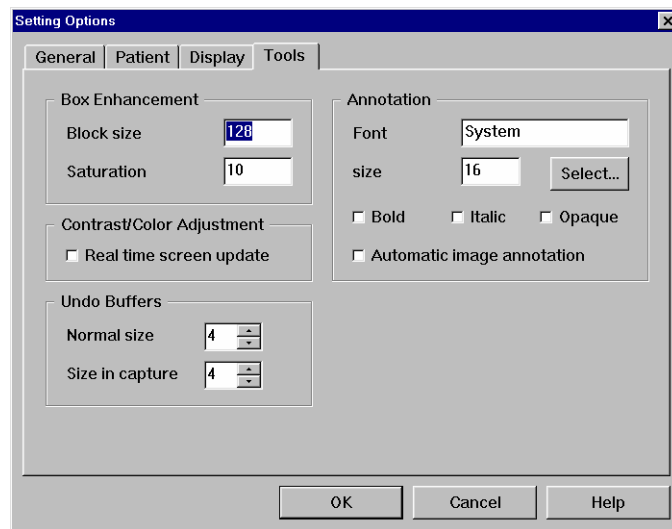


Figure 11-4 Tools Options Property Tab

Box Enhancement

Specify parameters for the box enhancement.

Block size

Size of local block.

Saturation

Saturation level of enhancement.

Contrast/Color Adjustment

Real time screen update

Displays the adjusted image immediately.

Annotation

Defines the font and character height used by 'Annotate Image' in the Tools menu.

Font

Select or specify the font.

Size

Specify height of characters.

Automatic image annotation

Performs automatic image annotation whenever an image is displayed.

Undo Buffers

Specify parameters for the tool undo buffers.

Normal size

Size of undo buffer for tools.

Size in capture

Size of undo buffer when a capture window is opened.

Chapter 12

Other Features

12.1 Adjust Window to Image

When an image is displayed on the screen, IMAGEnet tries to set the image window size to the image size. If it's not possible, IMAGEnet sets the window size as large as possible. However the window size may be changed by the mouse or by some commands that affect the window size such as 'Tile' and 'Cascade' in the [Window] menu.

To adjust the image window size to the image size again, set the image window to adjust active, then choose 'Adjust to Image' in the [Window] menu or click the adjust icon on the tool bar. This will adjust the window size immediately without affecting other image windows. Window position will also be changed if necessary.

12.2 Changing Display Image Size

If a displayed image is too small or too big to view on the screen, the display size of the image may be changed using the drop down list box on the tool bar. The drop down list box contains the display ratios 50%, 75%, 100%, 150% and 200%. As a default, the display ratio for an image newly displayed is set to 100%. If an image is too small to view, choose 150% or 200% to make the size bigger. If an image is too big to fit the entire image in the screen, choose 75% or 50% to make the size smaller. These changes are only for display purposes and will not affect to the original image data in memory.

The drop down list also contains the selections : 'Largest' and 'Resize'. 'Largest' will set the display ratio for an image as large as possible to fit the screen. 'Resize' resizes an image permanently to the display size currently set. This will change the original image data, and the display ratio will be reset to 100%.

Notice

An image with display ratio not equal to 100% cannot be measured or compared using the Measure function or the Compare function. In such a case, reset the display ratio of the image to 100% or 'Resize' the image permanently.

12.3 Duplicate Image Window

To keep images enhanced by the tools without a warning about the undo buffer, choose 'Duplicate Window' from the [Window] menu or click the duplicate icon on the tool bar. This operation creates a copy of the image in the active window. The copy is completely

independent from the original image and the image window. Keep applying tools to the image in the duplicated window, and the original image will not be affected.

The image window created by this operation has the version No. at the end of the window title. The version No., <1>, <2>, , , will be automatically incremented as it is duplicated. The number of copies that can be keep depends on how much memory is available in the system.

12.4 Hiding Tool Bar and Status Bar

Hide the tool bar and status bar to make more space in the IMAGEnet window. To hide the tool bar, choose 'Toolbar' in the [View] menu. A check mark will be placed at the head of 'Toolbar' in the pull-down menu, and the tool bar will disappear. To hide the status bar, choose 'Status Bar' in the [View] menu. A check mark will be placed at the head of 'Status Bar' in the pull-down menu, and the status bar will disappear. To show these bars, choose the same menu item, 'Toolbar' or 'Status Bar' in the [View] menu again. These menu items work as a toggle to hide and show the bars.

12.5 Cascade, Tile and Arrange Icons

Arrange image windows by choosing 'Cascade' or 'Tile' in the [Window] menu. 'Cascade' arranges all image windows in an overlapping pattern. 'Tile' arranges all image windows in a tile pattern. 'Arrange Icons' in the [Window] menu arranges image icons, (minimized image windows), along the bottom of the IMAGEnet window.

12.6 Getting Help

Choose 'Help Topics' in the [Help] menu to display the opening screen of Help. This allows jumping to step-by-step instructions for using IMAGEnet and various types of reference information. Alternatively, click the Toolbar's Context Help button, the mouse pointer will change to an arrow and question mark. Then click anywhere in the IMAGEnet window. The Help topic will be shown for the item clicked.

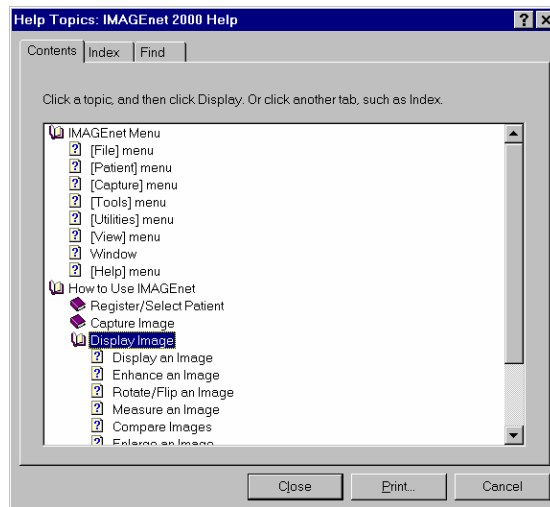


Figure 12-1 IMAGenet Help

To access the proper reference information for a dialog box, hit the F1 key while the dialog box is displayed. This operation directly pulls up the help screen related to the dialog box.

Appendix A

Print Template

A.1 Overview

IMAGEnet uses a print template to customize the page layout of images and their pertinent information. A print template is a single page document made in Windows WRITE format. IMAGEnet also provides an “Edit Print Template Utility” to support user intervention for creating a customized print template. Figure A-1 shows a sample print template.

Topcon America Corporation
37 West Century Road, Paramus, NJ 07652
Tel: (201)261-9450 Fax: (201)634-1365

Patient: 1024, FA & ICG

ID: 027167742

Procedure: Fluorescein

DATE: 06-24-1999

Chart No:

Physician: WALSH

Notes:

Comments:

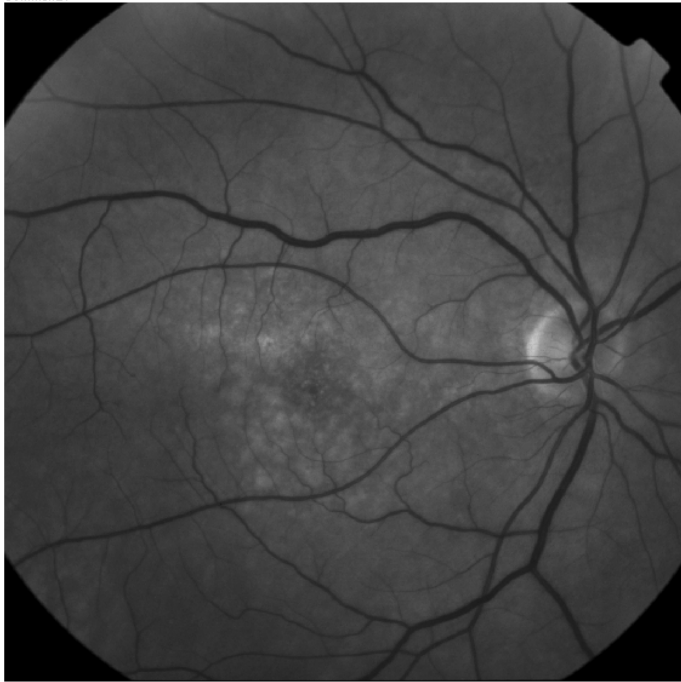


Figure A-1. Sample Print Template with customizable fields

A.2 Creating Print Template

To start IMAGENet Edit Template Utility, simply choose “Utilities | Edit Print Template”. A dialog box, as shown in Figure A-2, will appear.

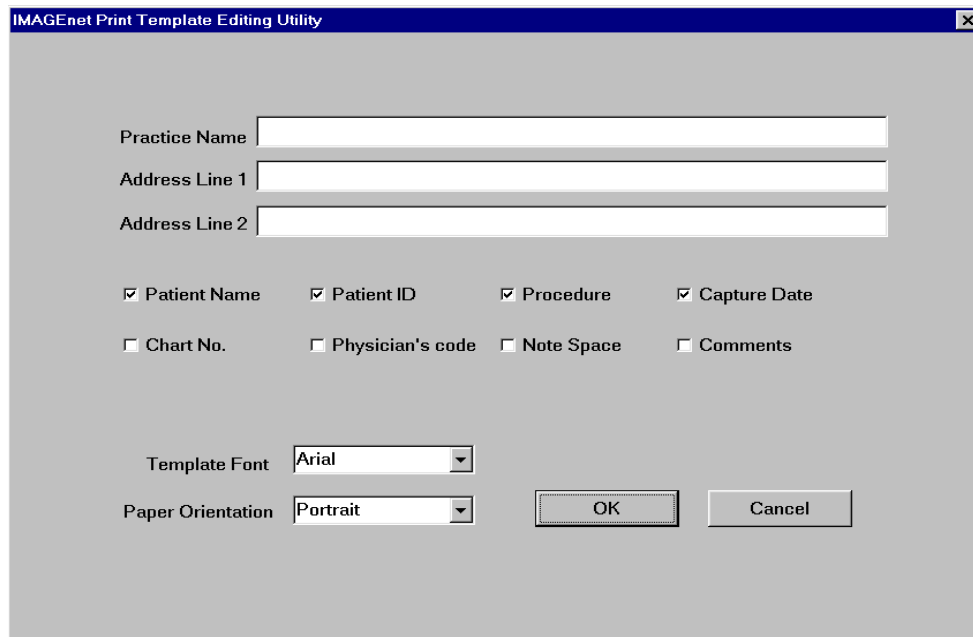
The image shows a screenshot of a Windows-style dialog box titled "IMAGENet Print Template Editing Utility". The dialog box has a grey background and a blue title bar with a close button (X) in the top right corner. Inside the dialog, there are several input fields and checkboxes. At the top, there are three text input fields labeled "Practice Name", "Address Line 1", and "Address Line 2". Below these, there are two rows of checkboxes. The first row has four checked checkboxes: "Patient Name", "Patient ID", "Procedure", and "Capture Date". The second row has four unchecked checkboxes: "Chart No.", "Physician's code", "Note Space", and "Comments". Below the checkboxes, there are two dropdown menus. The first is labeled "Template Font" and has "Arial" selected. The second is labeled "Paper Orientation" and has "Portrait" selected. At the bottom right of the dialog, there are two buttons: "OK" and "Cancel".

Figure A-2 Edit Template Utility Dialog Box

To customize the print template,

- (1) Fill in the practice name, address, and telephone number etc.
- (2) Choose the appropriate patient information fields (Patient Name, ID, etc). The print template will include the checked fields and omit the rest. By default, the fields “Patient Name”, “Patient ID”, “Procedure”, and “Capture Date” are pre-checked.
- (3) Choose a Template Font (“Arial” or “Times New Roman”).
- (4) Choose a Print Paper Setup (“Portrait”, “Landscape”, “Quick 2 up” or “Custom”). The first three choices have fixed paper size and margins. When “Custom” is chosen, the following dialog box will appear, in which the user can specify the paper size and margins.

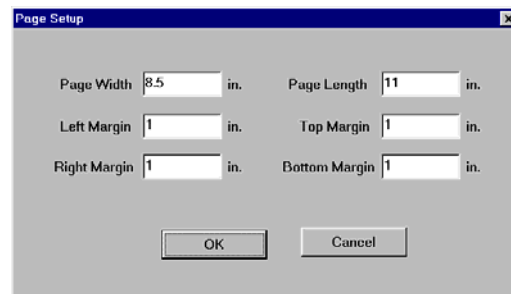


Figure A-3. Page Setup Dialog Box

(5) Click on “OK”, a print template will be generated automatically.

Appendix B

Jukebox Support

IMAGEnet now supports jukeboxes as a series of alternate archive drives. These drives are scanned as alternative archive drives, and the disk labels on these disks are cached to avoid annoying disk changes. Disk labels are also stored in IMAGENET.INI so that IMAGEnet is able to keep track of the disk information.

A jukebox is defined using the IMAGEnet Setup Program SETUP.EXE. IMAGEnet scans all the drives of the jukebox the first time it is used. This might take awhile if the number of drives is great. However, once the drives are scanned and all the disk label information is cached, IMAGEnet will find the necessary disk without scanning the drives.

B.1 Displaying an Image from a Jukebox

When displaying an image through the 'Open...' command in the [File] menu, IMAGEnet scans all disk labels in the cache instead of reading disk labels on each disk to find the one with the required disk number. If the disk was found in the cache, IMAGEnet actually reads the disk label on the disk, and checks if the disk number of the disk is correct. If the disk number is correct, IMAGEnet starts loading image from the disk. If the disk number is not correct or the disk number was not found in the cache, IMAGEnet displays the following dialog box :

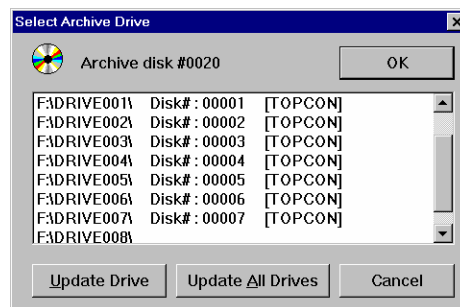


Figure B-1 Select Archive Drive

Select the drive in which the disk is mounted, then click 'OK'. Use the 'Update Drive' button to update the disk label information of the highlighted disk drive. Use the 'Update All Drives' button to update the disk label information of all disk drives in the list.

B.2 Copying Images from a Jukebox

Unlike when displaying an image, there is no 'specified disk number' when copying images using a system database. Therefore, IMAGEnet immediately displays the 'Select Archive Drive' dialog box to select a disk to be accessed as the source disk when 'Archive Disk' is selected as the source.

The jukebox also appears in the source database list, and the same dialog box will be displayed if the jukebox is selected as the source database. In this case, the HISTORY file on the disk will be used as the database.

Jukebox drives are currently only supported as read only. These drives cannot be selected as a destination of the 'Save...' command in the [File] menu and the 'Copy/Delete Images...' command in the [Utilities] menu.

Appendix C

CD Recording Utility

C.1 Overview

IMAGEnet allows patient images and information be stored (archived) permanently and periodically to a series of compact disks (CDs). These CDs are sequentially numbered (0001-9999) for easy access of patient data of any given previous visit. Each CD holds information of approximately 650MB, which, if 16 images are shot of each patient, allows data of 32-37 patients be stored.

Before a CD is created, the patient data are "mastered" in a special partition of the computer hard drive referred to as the *Archive Disk*. The *Archive Disk* has a capacity of approximately 615MB (similar to the capacity of a CD). Images being captured should be saved directly to the *Archive Disk* **unless** you need to edit the number of images in proofsheets after you save them (See chapter 8.1 for detail).

When the *Archive Disk* is full, a message will appear on the screen indicating there is insufficient space on the *Archive Disk*. It is time to create a CD.

C.2 Using CD Recording Utility

To make the backup process of your patient data as effortless as possible, IMAGEnet (ver 2.10 or higher) offers a "one-button" solution for recording CD(s) from the *Archive Disk*: simply place a blank CD in the CD writer, and click the menu choice "*Utilities | Finish CD*". The CD Recording Utility will automatically take you through the following three steps:

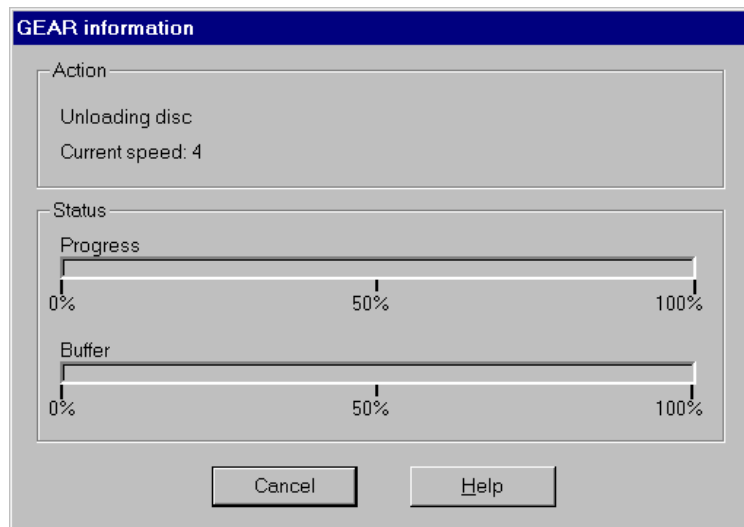
(1) Record CD from the *Archive Disk*. First, you will see an information dialog box



indicating the disk number of the *Archive Disk* and the copies of CDs you would like to record. Click "OK" here. The program will automatically initiate the GEAR software for CD recording. You will see a GEAR splash screen



Followed by a progress screen.



The process may take approximately 15 minutes, as indicated by a progress screen. At completion, the CD tray of the recorder will slide out.

(2) Archive array process. After the CD(s) is made successfully, the CD Recording Utility will automatically initiate the process of moving data from the *Archive Disk* to the *Array Drives*. The IMAGEnet system has been setup with enough storage space (the *Array Drives*) for a number of previous archive disks being kept "on line", so that the user can assess these data without the need of the CD(s) (See Appendix B for detail). This process will take approximately 5 minutes, as indicated by the progress bar on the left upper corner of the screen.

(3) Re-initialize the *Archive Disk*. CD Recording Utility will automatically re-initialize the *Archive Disk* with the next sequential number, so that it is ready for saving data of new patients.

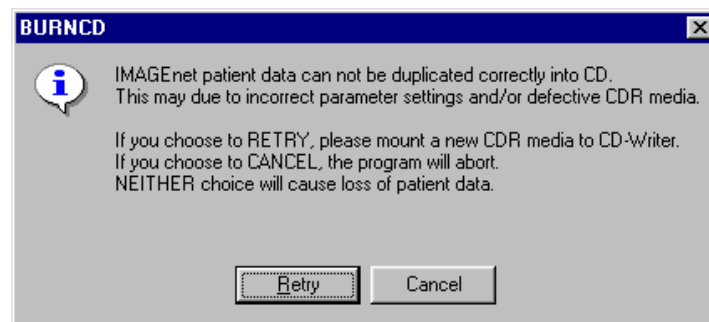
NOTE: Please **DO NOT** attempt to use the system for capture or reviewing or any other window multi-tasking during the CD recording process. Failure to do so may cause loss of your precious patient data.

C.3 Verifying the CD (Recommended)

Take the CD from the tray and place it into the reading drive. Once there, click on *Patient*, and from the drop down menu click *Select Database / Drive*. This will list all devices containing IMAGEnet images/data. Load the CD-ROM Reader database and check randomly several patients to insure that the images were correctly copied. When proper recording of the CD has been established, be sure to properly label the CD with the sequential number given by IMAGEnet.

C.4 Miscellaneous

(1) In very rare cases, errors may occur during the CD recording process (step 1), due to a defective blank CD manufactured by other parties. The CD Recording Utility is capable of detecting such errors. Once detected, the following information dialog box will appear



Please note that NO patient information will be damaged here. Simply replace the CD with a new (blank) one and click "Retry". The CD Recording Utility will attempt to re-write the *Archive Disk* to the CD. If the problem persists, please contact IMAGEnet technical support.

(2) Multiple copies of CD(s) can be made per *Archive Disk*, though the CD Recording Utility records one copy by default. The number of copies is specified in the file BURNCD.INI, which is created automatically the first time the CD Recording Utility runs. If you wish to activate this feature, please contact IMAGEnet technical support.

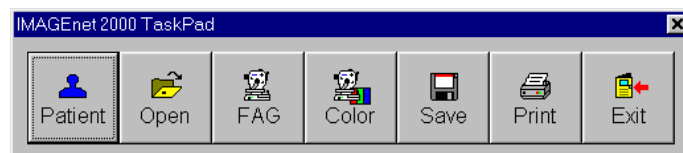
Appendix D

IMAGEnet TaskPad Extended Function DLL

D.1 Overview

The tool bar in IMAGEnet is a standard Windows style task bar which most Windows applications have. At the time the tool bar was designed, the typical Windows desktop size was 640x480 or 800x600 at most. Lately, IMAGEnet is run on a Windows desktop with the 1280x1024 resolution, and the 1600x1200 resolution sometimes. Therefore the original IMAGEnet tool bar is obviously too small to view and use on a Windows desktop at such a high resolution.

IMAGEnet TaskPad is an extended function DLL for IMAGEnet that works as a task pad with much bigger buttons, approximately twice as big as the original buttons on the IMAGEnet tool bar. IMAGEnet TaskPad holds up to a maximum of 16 bitmap buttons and the user may choose what icon and what command to assign for each button. Any commands in the IMAGEnet menu are definable including capture procedures in the Capture menu. At this moment, 33 icons (for 22 standard menu commands, 7 capture procedures and 3 general-purpose command icons) are available.



IMAGEnet TaskPad may be located at the upper left corner, upper right corner, lower left corner or the lower right corner, and may be chosen either in the horizontally in-line layout or in the vertically in-line layout. IMAGEnet TaskPad has a series of bitmaps in 2 different sizes for covering all varieties of desktop settings.

IMAGEnet TaskPad uses the IMAGEnet extended function DLL interface and may be used with both IMAGEnet R-2.03 and R-2.10. (Won't work with R-2.02 and earlier)

D.2 Installing IMAGEnet TaskPad

IMAGEnet TaskPad is easily installed from the IMAGEnet TaskPad Installation Diskette. Only the destination folder will be asked for during the installation. “C:\Program Files\Topcon\IMAGEnet TaskPad” is set as the default. Upon completion, the following definitions are added to the system registry:

IMAGEnet R-2.03

- Location **HKEY_CURRENT_USER\Software\TOPCON\IMAGEnet\Patient**
- Definition **PatientDialog=Path to TaskPad.DLL**

IMAGEnet TaskPad is loaded through the Patient Dialog DLL interface. In the case that both the TaskPad DLL and the Patient Dialog DLL are needed, upgrade the system to R-2.10.

IMAGEnet R-2.10

- Location **HKEY_LOCAL_MACHINE\Software\TOPCON\IMAGEnet\2.00\Library**
- Definition **InstanceProcessor=Path to TaskPad.DLL**

A new item ‘TaskPad Setup’ is also added to the IMAGEnet start menu.

IMAGEnet TaskPad consists of the following 3 files:

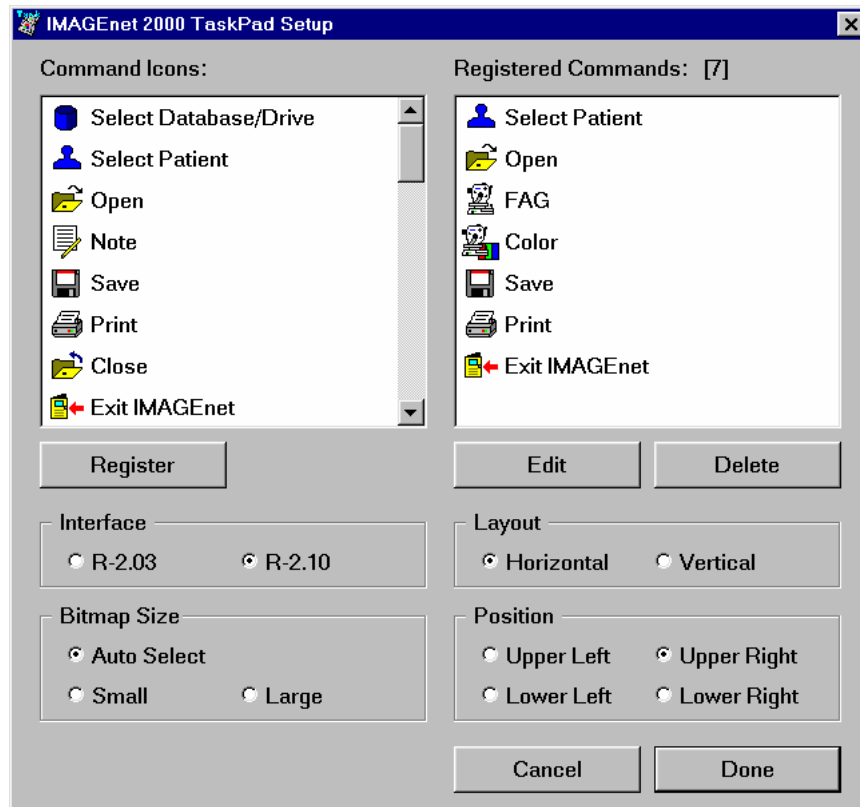
- TASKPAD.DLL IMAGEnet TaskPad Dynamic Linking Library
- TASKPAD.CFG IMAGEnet TaskPad Configuration File
- TASKSET.EXE IMAGEnet TaskPad Configuration program

TASKPAD.CFG is the configuration file for TASKPAD.DLL and will be created and maintained by the configuration program TASKSET.EXE. TASKPAD.CFG is a simple text file, which can be edited by using a text editor such as NOTEPAD. These files must be located in the same folder because both TASKSET.EXE and TASKPAD.DLL assume TASKPAD.CFG is in the same folder.

If IMAGEnet TaskPad is used with IMAGEnet Network Viewers, install IMAGEnet TaskPad from one of client machines to the IMAGEnet folder on the server once. Then add the above registry key with the path to TASKPAD.DLL on the server at all the rest of the client machines.

D.3 Configuring IMAGEnet TaskPad

IMAGEnet TaskPad is configured by TASKSET.EXE which is also installed by the IMAGEnet TaskPad Installation Diskette. TASKSET.EXE can be run from the IMAGEnet start menu.



To configure IMAGEnet TaskPad, simply double-click commands to be assigned to the TaskPad buttons in the command list at the left of the above dialog box. The commands registered to TaskPad will be shown in the registered command list at the right. The command double-clicked first will be assigned to the first button, the command double-clicked second will be assigned to the second button. If a standard command is not assigned to an icon, choose the command in the registered command list, then click the 'Edit' button to change the menu command number originally assigned to the icon.

A special caution is required when registering capture procedures. The capture procedure registered first launches the first capture procedure in the Capture menu. The capture procedure registered second launches the second capture procedure in the Capture menu. Therefore the command number for these capture procedures has to be changed for the case where a capture procedure in the Capture menu is skipped in IMAGEnet TaskPad.

D.4 TASKPAD.CFG

The following information is stored in the configuration file TASKPAD.CFG:

Section [TaskPad]

InterfaceMode=[0|1]

- = 0 IMAGEnet R-2.03 Interface
- = 1 IMAGEnet R-2.10 Interface

TaskPadLayout=[0|1]

- = 0 Layout buttons in-line horizontally
- = 1 Layout buttons in-line vertically

TaskPadPosition=[0|1|2|3]

- = 0 Upper Left Corner = 1 Upper Right Corner
- = 2 Lower Left Corner = 3 Lower Right Corner

BitmapSize=[0|1|2]

- = 0 Auto Select
- = 1 Small Bitmap
- = 2 Large Bitmap

Button#=Icon ID., Command No. (# = 1 to 16)

- Icon ID. Icon ID. Name
- Command No. Menu Command Number

See Command Table on the next page for actual values.

<u>Menu</u>	<u>Command</u>	<u>Icon ID. Name</u>	<u>Command No.</u>
[File]	"Open"	FILE_OPEN	57601
	"Close"	FILE_CLOSE	57602
	"Save"	FILE_SAVE	57603
	"Print"	FILE_PRINT	57607
	"Note"	FILE_NOTE	32924
	"Exit IMAGEnet"	FILE_EXIT	57665
[Patient]	"Select Patient"	PATIENT_SELECT	32785
	"Select Database/Drive"	PATIENT_DATABASE	32772
[Tools]	"Undo"	TOOL_UNDO	32807
	"Negative Image"	TOOL_NEGATIVE	32799
	"Expand Contrast (Med.)"	TOOL_EXPAND	32930
	"Adjust Contrast/Color"	TOOL_ADJUST	32793
	"Box Enhancement"	TOOL_ENHANCE	32794
	"Annotate"	TOOL_ANNOTATE	32790

	"Add to 4Up"	TOOL_4UP	32787
	"Add to 9Up"	TOOL_9UP	32788
	"Add to 16Up"	TOOL_16UP	32786
[Utilities]	"Copy/Delete Images"	UTIL_COPY	32812
	"Transfer to Clipboard"	UTIL_CLIPBOARD	32809
[Window]	"Adjust to Image"	WINDOW_ADJUST	32820
	"Duplicate"	WINDOW_DUPLICATE	57648
[Help]	"Help Topics"	HELP_CONTENTS	57667
[Other]	"Load Proofsheets"	LOAD_PROOFSHEET	32778
	Dash #1 (General)	COMMAND_EXTRA1	
	Dash #2 (General)	COMMAND_EXTRA2	
	Dash #3 (General)	COMMAND_EXTRA3	
[Capture]	Fluorescein	CAPTURE_FLUORESCHEIN*	¹
	Color	CAPTURE_COLOR*	¹
	ICG	CAPTURE_ICG*	¹
	Non-mydratic Color	CAPTURE_NONMYD_COLOR*	¹
	Non-mydratic B/W	CAPTURE_NONMYD_MONO*	¹
	Slitlamp	CAPTURE_SLIT*	¹
	Cell	CAPTURE_CELL*	¹
[Program]	Cell Analysis	PROGRAM_ENDOCELL*	²
	Quick Draw	PROGRAM_QUICKDRAW*	²
	Image Densitometry	PROGRAM_DENSITY*	²

(*¹) A serial number starting at 32900 will be assigned to the capture procedures.

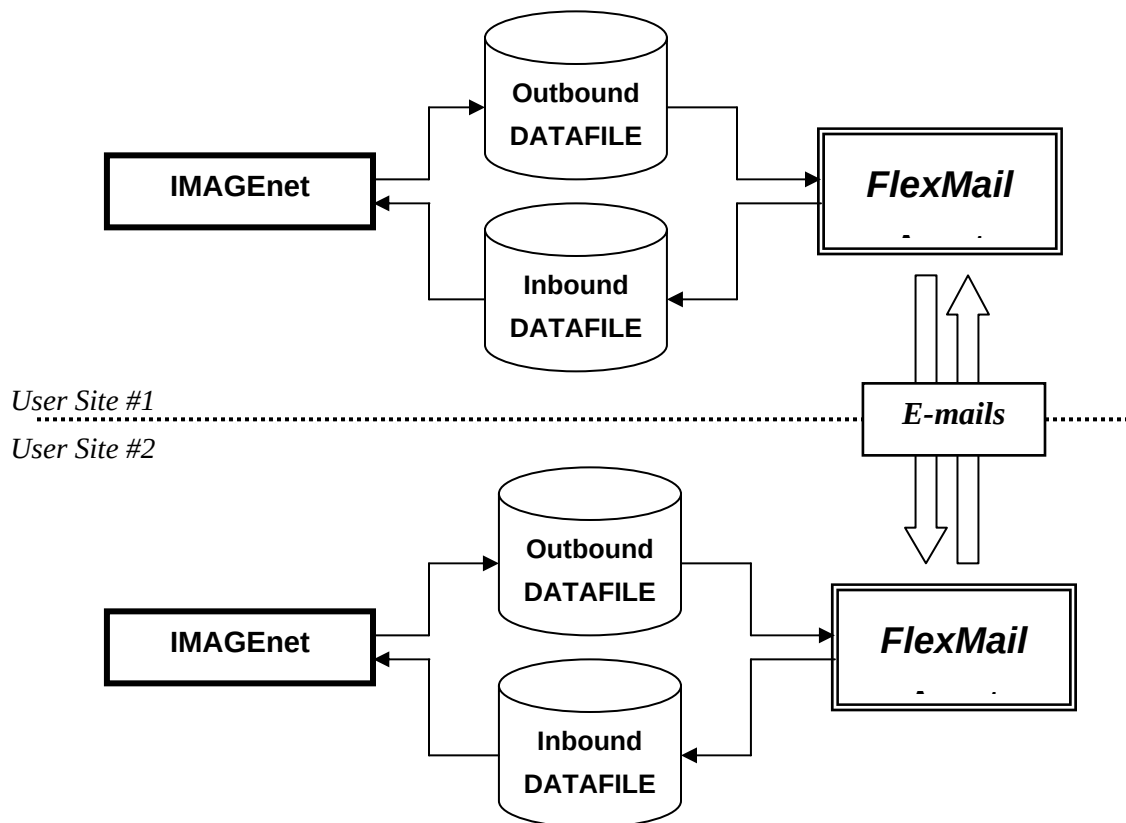
(*²) A serial number starting at 32932 will be assigned to the external programs.

Appendix E

FlexMail Agent

E.1 Overview

As the second stage of the wide area networking in IMAGENet, FlexMail Agent is now ready for everyone who wants to exchange and share images via the Internet. FlexMail Agent is an independent program that automates image exchange among IMAGENet databases. FlexMail Agent sends images stored in a specified DATAFILE drive as a series of E-mails to the specified destination. FlexMail Agent also receives such E-mails and restores images attached to the E-mails to the specified DATAFILE drive.



Compared to the Send Image function of IMAGENet, which directly sends the image on the screen, FlexMail Agent requires an extra step, saving images to be sent to a DATAFILE. However, FlexMail Agent sends and receives proofsheets as a proofsheets. It is a good idea to prepare a cheap E-mail server machine in the IMAGENet network and run FlexMail Agent on that machine. This avoids consuming resources of the other IMAGENet client machines.

E.2 Configuring Transmission

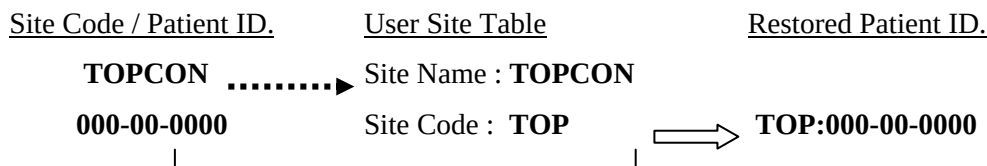
Since FlexMail Agent is a control program which is put into the task bar, it is natural to include the command to start FlexMail Agent in the Startup group. Of course FlexMail Agent will send and receive E-mails whenever requested, however running FlexMail Agent in the automatic mode is the best way. The following are the variety of configurations in the automatic mode:

- FlexMail Agent should only send images, only receive images or should do the both.
- FlexMail Agent should send and receive images on startup.
- Transmission period (Begin and end transmission)
- Transmission cycle (may be set independently for Send and Receive)
- Daily Transmission at fixed times

Any combinations of the above settings are possible. For example, it is possible to set the transmission schedule like “Send and receive images once on startup, then send images every 15 minutes and receive images every 30 minutes, from 7:00am to 8:00pm”.

E.3 Setting Destination

As the default configuration, FlexMail Agent sends images to just one particular destination. However FlexMail Agent may of course receive images from two or more user sites. FlexMail Agent has the ability to add the user site code for which the images have been transmitted from to the patient ID. code in the restored image record in DATAFILE. This will make the received images easily identified by the attached user site code in the patient ID. code.



In addition, FlexMail Agent automatically chooses the correct destination for the image to be sent if it has a user site code in the patient ID. code. The user site code in the patient ID. code will be removed before the image is actually sent. (In the above example, TOPCON is equal to the entry name of the address book for the user site)

FlexMail Main Dialog

IMAGENet FlexMail Agent R-1.00

Settings

Profile Name: Outlook

Recipient Name: TOPCON

Sender's Name: TOPCON Corporation

Transmit Mode: ☒ Both ☐ Send ☐ Receive

JPEG Quality

☐ High

☐ Medium

☒ Low

☐ As Is

Send

Database File: C:\MailDrive\Out\

Send Cycle: 15 min.

Receive

Database File: C:\MailDrive\In\

Receive Cycle: 30 min.

☐ Save images in DICOM file format

Transmit

Options..

Unload

Idle

Close

Options Dialog

IMAGENet FlexMail Options

Sender Management

☒ Add sender's code to patient ID's

Sender's code separator: [:]

RDU R & D USA
TOP TOPCON

Add Edit Delete

Transmission Management

☐ Transmit on startup

Regular Transmission:

Start Transmission: 07:00 Add

End Transmission: 20:00 Delete

12:00
15:00

OK

Cancel

Appendix F

MPS Disc Area Circles/PDT Circles (Optional Module)

F.1 Starting the Function

In IMAGEnet, display an image, then select the command name from the 'Utilities' menu. The image window must be active when the command is selected. When started, the following dialog box will be displayed with the original image displayed in the dialog box. This dialog box mainly consists of the image window, 4 icons, 2 or 3 function check boxes, and 6 color patches with radio buttons. There may be only 2 function check boxes, **AREA** and either **MPS DA** or **PDT**, if only a dual function version of this utility has been installed.

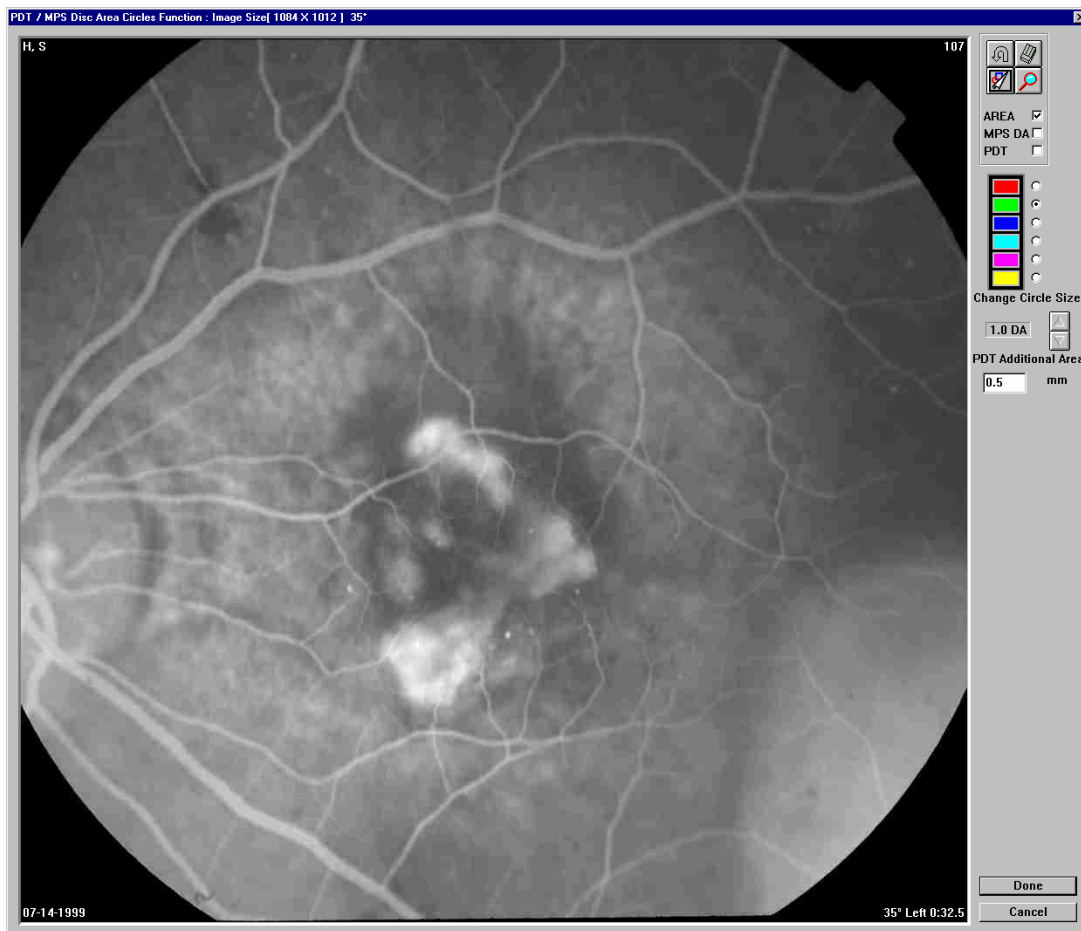


Figure 1. Main Dialog Box

The current mode is controlled selecting one of the function check boxes to the right of the image.

AREA

This function is an enhanced version of the regular area measurement function in IMAGEnet. The enhancement involves also calculating the area in Disc Area(DA) units. In order to measure a pathology, move the cursor to somewhere along its edge, then trace around the edge while holding down the left mouse button. After tracing around the pathology so that the cursor is near its starting point release the mouse button. The traced area will be calculated and displayed.

MPS DA

This function allows a MPS (Macular Photocoagulation Study) grader to put the graphic equivalent of a disc area circle from the MPS Disc Circles Template on the displayed image. All 9 sizes from 1 DA to 16 DA are supported as long as the magnification of the displayed image is small enough to fit the entire circle. (1 DA = 2.545mm²)

PDT

This function allows a PDT (Photo Dynamic Treatment) planner to put the desired laser treatment size on the digital image. The pathology to be treated must first be traced in the same manner as the **AREA** function. In addition to the area results, a line will be drawn within the area along its greatest linear distance. Finally a circle will be drawn encompassing and centered on the area with the additional radius specified in the **Additional PDT Area** box. This circle can be used to provide the necessary over-treatment as described by the treatment protocol.

Icons to be used for deleting the drawing

To delete the graphics, use the following icons located at the right of the image window.



To delete the last operation, use this function.



To delete all graphics in the window, use this function. Graphics on the original image can *not* be deleted.

Icons to be used for changing display mode

To toggle the graphics on/off or between a zoomed and a normal image, use the following icon located at the right of the image window.



This function is enabled only when the icon is pressed. The drawing will be hidden in order to get a better view of the image underneath. But the graphics on the original image can *not* be hidden. The drawing will return when the icon is released.



This function toggles between a zoomed and a normal image.

6 Color radio buttons to be used for drawing

To select the graphics color for drawing, use this function.

Icons to be used for changing MPS DA circle size



To change Circle size, use these arrows. The current [Circle Size] will also be displayed. The circle size may also be changed by clicking the right mouse button while the cursor is on the image.

Additional PDT Area

To change the additional circle radius, enter the desired value in millimeters. A value of 0.0 will encircle the area exactly with no additional radius.

Exiting the MPS Rings Utility

To exit the MPS Rings Utility, click the Done button. The original image in the IMAGEnet window will be replaced by the analysis results.

Printing Analysis Results

Exit the MPS Rings Utility, then use the 'Print' command in the 'File' menu of IMAGEnet.

Saving Analysis Results

Exit the MPS Rings Utility, then use the 'Save' command in the 'File' menu to save the analysis results to any disk. The analysis results saved to a disk may be displayed at a later time.

Appendix G

Mosaic 2000 (Optional Module)

G.1 Starting the Mosaic 2000 Utility

In IMAGENet, display a proofsheets image, then select the 'Mosaic 2000' command from the 'Utilities' menu to start the Mosaic Utility. The image window must be active when the command is selected. When the Mosaic Utility is started, the following window will be displayed with the original images in the proofsheets displayed in the window. The images, if taken with position data by a TRC-NW6S/SF, are displayed as a mosaic image as shown in Figure 1 automatically.

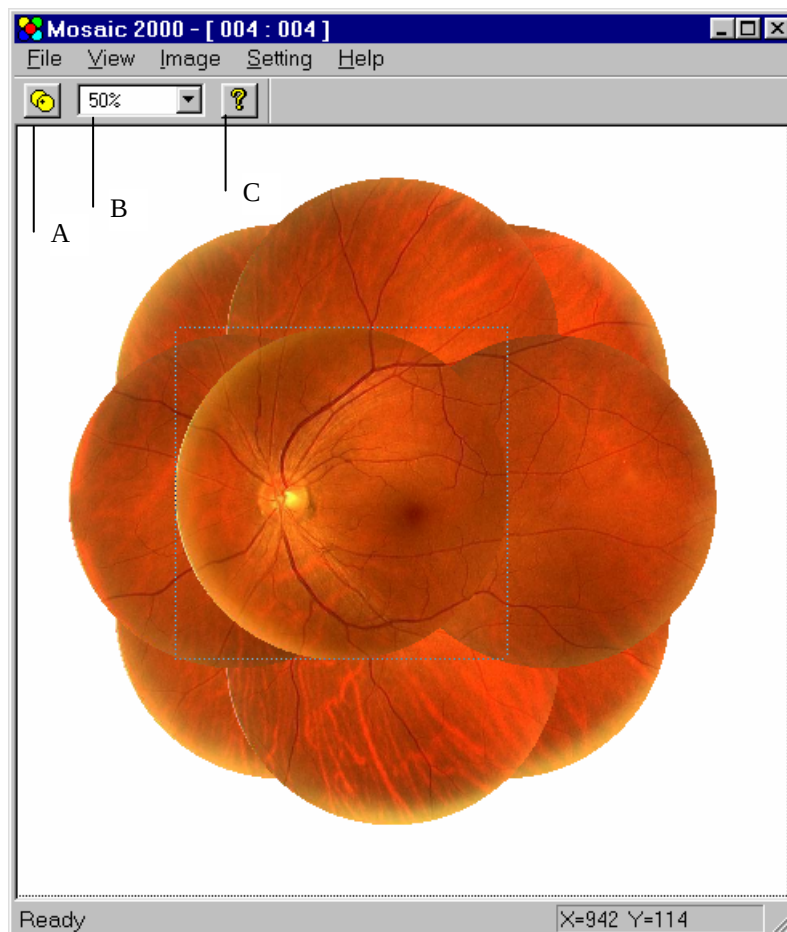


Figure 1. Mosaic Window

G.2 Functions

[File]

Recent Masks

4 selected masks appear in the list.

Exit

Exit the Mosaic software.

[View]

Tool bar

Show/Hide the Tool bar.

Status bar

Show/Hide the Status bar.

Tracker

Show the square surrounding the selected image.

Display Magnification (Marked as B in Figure.1)

Show all images at 25%, 50% or 100% their original size. Default is 50%.

[Image]

(This menu is the same as the right button of the mouse)

Bring to Front

Bring the image to the front if some images are overlapping it.

Send to Back

Send the image to back if some images are overlapping it.

Bring Forward

Move the image one image forward if some images are overlapping it.

Bring Backward

Move the image one image backward if some images are overlapping it.

Overlap Images (Marked as A in Figure.1)

Align an image to the selected point on another image in order to overlap the two images.

Delete Images

Delete the selected images.

[Setting]

Background Color

Select the background color as either White or Black.

Option Setting

As shown in Figure 2.

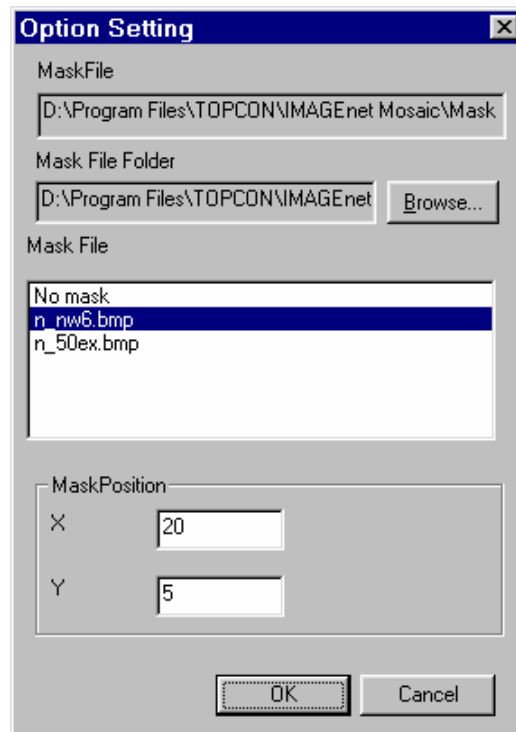


Figure 2. Option Setting

Mask File

Show current image mask file.

Mask File Folder

Select the set image mask file folder using the Browse button.

Mask Position X, Y

Set the offset position of mask image overlay the retinal images.

[Help]

Show the software version. (Marked as C in Figure.1)

Example Image

The following image is an example of a result image window.

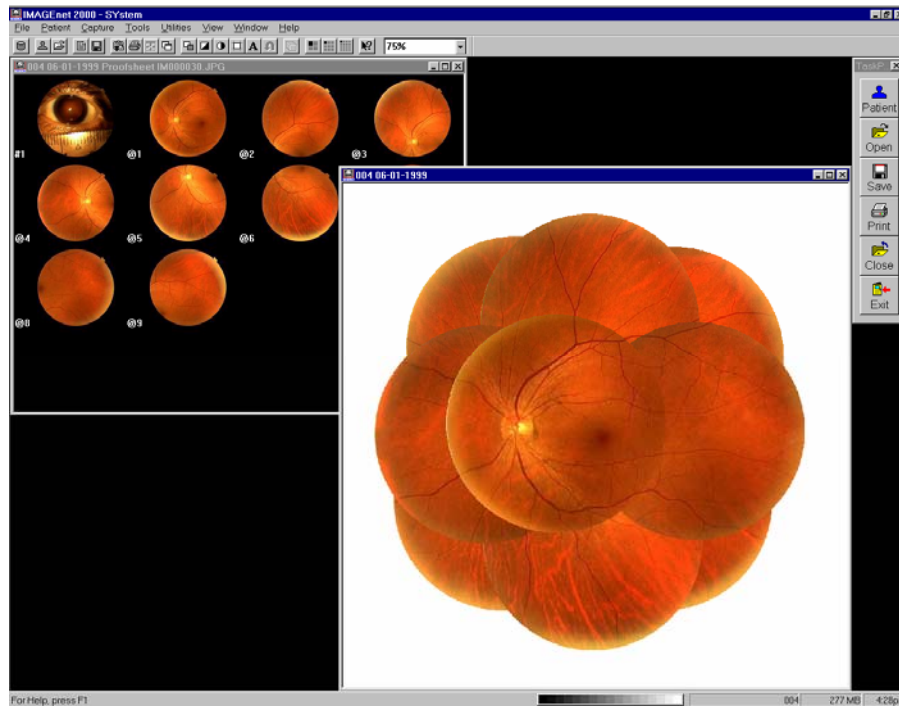


Figure 3. Result Image

Exiting the Mosaic Utility

To exit the Mosaic Utility, select the 'Exit' on 'File' menu. The result image will be displayed in a new window.

Printing Result Image

The Mosaic Utility does *not* print the result image. Return to IMAGENet, then use the 'Print' command in the 'File' menu of IMAGENet.

Saving Result Image

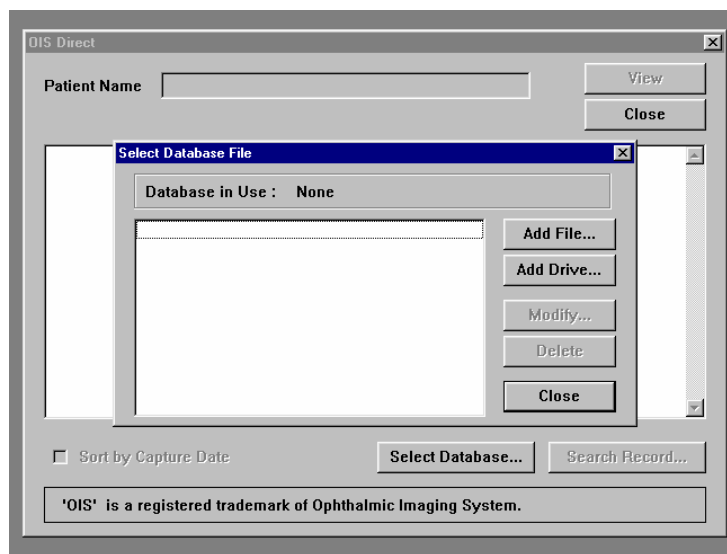
The Mosaic Utility does *not* save the result image either to the hard disk or to an archive disk. Returning to IMAGENet, then use the 'Save' command in the 'File' menu to save the result image to any disk. The result image saved to a disk may be displayed at a later time.

Appendix H

OIS Viewer (Optional Module)

H.1 Setting up OIS Viewer

OIS viewer, once installed, will be on the *Utilities* menu in IMAGEnet. The first time it is used, it will produce a message “No database file defined”. Click **OK** and click **Select Database**.



Select **Add File...** and fill in the fields.

Data File:

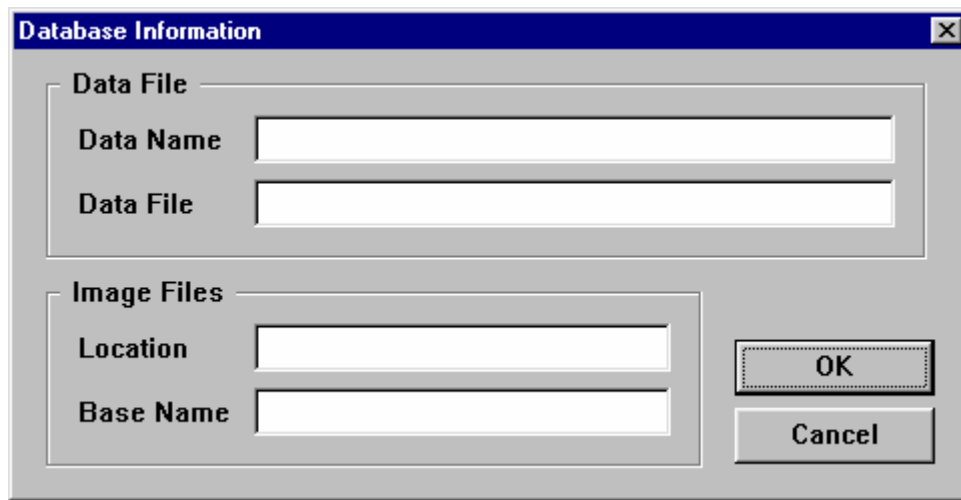
Data Name: *Assigned by installer. ex: Office #1 Database*

Data File: *Path to main OIS data file (dbase.dat)*

Image Files

Location: *Path to image files*

Base Name: *First three letters of the image filename ex: PHA*



The image shows a Windows-style dialog box titled "Database Information". It has a blue title bar with a close button (X) in the top right corner. The dialog is divided into two main sections. The first section, labeled "Data File", contains two text input fields: "Data Name" and "Data File". The second section, labeled "Image Files", contains two text input fields: "Location" and "Base Name". To the right of these input fields are two buttons: "OK" and "Cancel". The "OK" button is highlighted with a dashed border.

H.2 Using OIS in Capture Mode

In IMAGEnet Configuration, ADD procedure called OIS Direct (type this into Procedure Name), and use OISVIEW.DLL which is in the *Program Files/Topcon/Ois Viewer* folder. The Input channel etc. is irrelevant.

Open a capture window, hit the spacebar, and the same application interface used with OIS Viewer under the *Utilities* Menu runs. Images to be captured are clicked, which puts a red box around each. When the Transfer button is clicked, the images are “read” into memory. The program is exited fully, and the images begin appearing sequentially as captured images.

Appendix I

Endothelial Cell Analysis (Optional Module)

I.1 Introduction

The IMAGEnet Endothelial Cell Analysis System is an advanced image analysis software run as a part of IMAGEnet. It automatically determines density and hexagonality of endothelial cell images and reports statistical information regarding cell area.

The analysis procedure usually follows the steps described below:

- In IMAGEnet, display an endothelial image.
- Start the Endothelial Cell Analysis System.
- Specify the region to be analyzed in the image.
- Edit cell boundaries automatically extracted by the system.
- Perform the analysis again using the edited boundaries.
- Print the analysis results.
- Exit the Endothelial Cell Analysis System.
- Save the analyzed image to a disk if necessary.

The following information will be displayed by the Endothelial Cell Analysis System regarding to the specified analysis region in an endothelial cell image.

- | | |
|----------------|---|
| · Minimum Size | Minimum cell area in the analysis region. |
| · Maximum Size | Maximum cell area in the analysis region. |
| · Average Size | Average cell area in the analysis region. |
| · S.D. of Size | Standard Deviation of the area of the cells. |
| · C.V. of Size | Coefficient Variant of the area of the cells. |
| · Cell Density | The number of cells in 1 square millimeter. |
| · Hexagonality | The approximate percentage of cells with a hexagonal shape. |
| · Histogram | The histogram which shows a distribution of cell area. |

The analysis results may be printed to a printer and the analyzed image may be saved to the hard disk or an archive disk.

I.2 Starting the System

Preparing Cell Image

The Endothelial Cell Analysis System uses an endothelial cell image captured by IMAGEnet, IMAGEnet or the IMAGEnet-640 system. The image must have a correct scale factor which represents the actual pixel size in the image. If the device used for capturing the image is a TOPCON product such as SL-7E + Specular attachment or a SP-2000, the correct scale factor is automatically stored with the image. Otherwise, the scale factor must be determined using the Measure function of IMAGEnet prior to analyzing images. If such a device is used for capturing images, contact TOPCON for the further instructions.

Starting the System

In IMAGEnet, display an endothelial cell image, then select the 'Endothelial Cell Analysis' command from the 'Utilities' menu to start the Endothelial Cell Analysis System. The image window must be active when the command is selected.



Figure 1. Starting Endothelial Cell Analysis

Specifying Analysis Region

When the system is started, the following dialog box will be displayed with the original image displayed in the dialog box. This dialog box is the primary window of the system, and it consists of the image window and several icons.

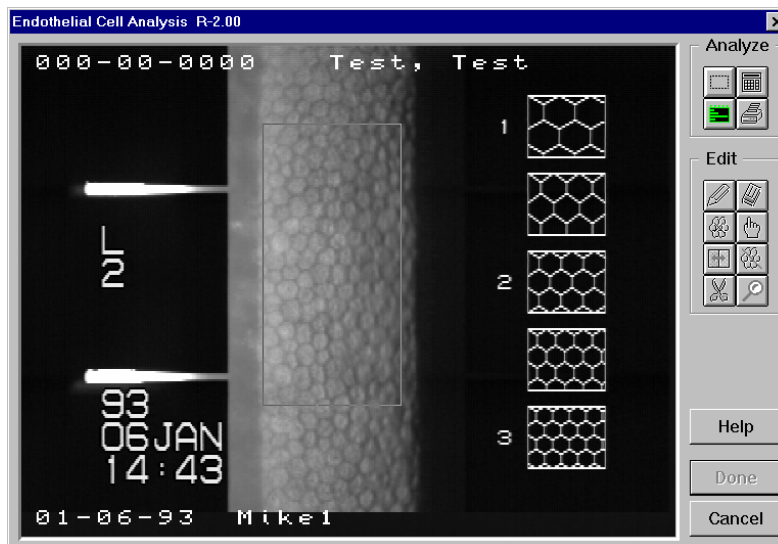


Figure 2. Specifying Analysis Region

To specify the region to be analyzed, move the mouse cursor to the upper left corner of the area, then hold down the left button. Drag the mouse to the lower right corner of the area and release the button. A guide frame will be displayed while dragging the mouse. To keep compatibility with IMAGEnet-640, there is a limit for the size of the analysis region.

The system cuts the region out and relocates it at the upper left of the image window, then starts analyzing the region automatically. The analysis result will be quickly displayed in the image window.

If the image has already been analyzed once, the Endothelial Cell Analysis System directly displays the analysis result based on the cell boundaries that already exist in the image.

I.3 Editing Boundaries

The Endothelial Cell Analysis System displays the analysis results in the image window using the boundary lines automatically extracted by the system. However, depending on the quality of the image, some boundary lines may not have been extracted and erroneous boundaries may have been found by the system. Such erroneous boundaries must be edited and corrected here to get the correct analysis result.

If the original image is clear and sharp, no correction may be needed. In such a case, simply skip this procedure.

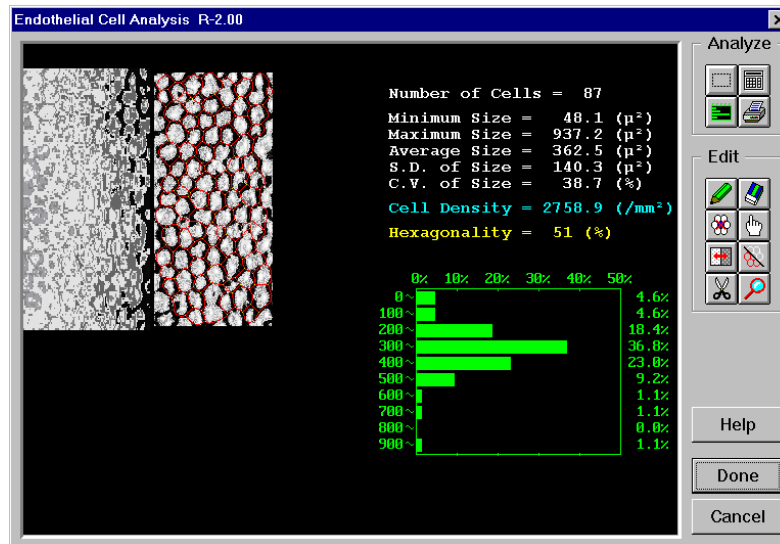


Figure 3. Editing Cell Boundaries

To edit these boundary lines, use the edit icons and the display mode icons located at the right of the image window. The mouse cursor will be changed according to the edit icon being chosen.

To get help for the edit operations and the analysis results, hit the 'F1' key anytime.

Icons to be used for boundary editing



To add boundary lines, click this icon once, and then move the mouse cursor to the image. Press the left button down at one end point of the line to be added, drag the mouse to the other end point of the line and release the button. Continue adding lines as needed. This mode will stay current until another edit icon is chosen.



If erroneous boundaries were found, they may be deleted using this function. Simply choose the icon, move the mouse cursor to the line to be deleted, and click the left button once. Continue deleting lines as needed. This mode will stay current until another edit icon is chosen.

The above 2 icons which will be used most often for editing the boundaries and may be toggled between using the right mouse button.



If there are numerous errors, it may be faster to erase an entire area of lines than to delete them individually. After choosing this icon, move the mouse cursor to the upper left corner of the region, then press down the left button. Drag the mouse to the lower right corner and release the button. This mode will stay current until another edit icon is chosen.



To perform analysis without taking into account certain cells, choose this icon, and then move the mouse cursor over the cell to be excluded and press the left button once. The cell will turn blue. To include this cell again, repeat the procedure.



After any changes have been made to the boundary lines or any cells have been excluded or included, click this icon to perform the analysis again. *The analysis results displayed in the image window will not be updated until this icon is clicked.*

Icons to be used for changing display mode



This function toggles between a zoomed and a normal image. Editing boundaries with a zoomed image may be easier than with the normal size.



This function swaps the left (original) and the right (enhanced) images. However, the boundary lines always stay overlaid on the right image.



This function is enabled only when the icon is pressed. The boundary lines will be hidden in order to get a better view of the image underneath. The lines will return when the icon is released.

I.4 Viewing Results

Analysis Results

If the  icon is clicked after erroneous boundaries have been edited and corrected, the system will again calculate and display the analysis results based on the corrected boundaries.

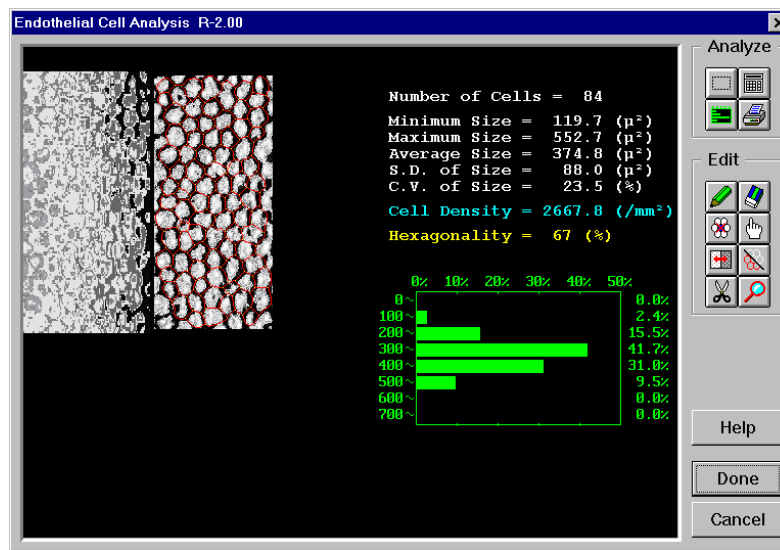


Figure 5. Final Analysis Result

The following information will be displayed in the image window:

Number of Cells

Number of cells detected in the analysis region. The maximum number of cells which will be detected in the specified region is limited to 510.

Minimum Size / Maximum Size

Minimum and maximum cell area in the analysis region (in square microns).

Average Size

Average cell area in the analysis region (in square microns).

S.D. of Size

Standard Deviation of the area of the cells.

C.V. of Size

Coefficient Variant. This represents $(\text{S.D. of Size} / \text{Average Size}) * 100$.

Cell Density

The number of cells in 1 square millimeter (calculated).

Hexagonality

The approximate percentage of cells with a hexagonal shape.

Histogram

The histogram which shows a distribution of cell area. Each bar represents the percentage of cells that belong to the areal zone. The range of the histogram and the scale used for the ordinate axis may be changed.

Area of Cell Boundaries

When determining the areal measurement of the endothelial cell, boundaries are assumed to have zero width. Therefore, at the final stage of measuring, the boundary lines are thinned to 1 pixel width. However, the boundary lines still have finite area. In this system, the area of these boundary lines are distributed to the cells that are divided by the

line. If a pixel which belongs to the boundary lines is adjacent to 2 cells, 0.5 pixels is added to the area of each of the 2 cells.

Definition of Hexagonality

Definition of polygonal shape of cells is based on the number of intersections of boundary lines surrounding the cell. If there are 6 intersections around the cell, the cell is recognized as a hexagon. Cells that are positioned along the edge of the analysis region are *not* included in the hexagonality percentage. Only the interior cells are used for measurement.

Icons to be used for viewing results



To find the area and number of sides for an individual cell, choose this icon, and then move the mouse cursor over the cell, and press down the left button. The area and number of sides will be shown in a small box while the button is pressed.



To change the settings for the histogram, click this icon. The [Setup Parameters] dialog box will be displayed. Change the settings, then click OK. The analysis results in the image window will be updated to the settings immediately.



To perform analysis without taking into account certain cells, choose this icon, and then move the mouse cursor over the cell to be excluded and press the left button once. The cell will turn blue. To include this cell again, repeat the procedure.

In addition, any of icons to be used for changing display mode may be used here.

The region to be analyzed may be changed even after the analysis is done. To specify the region to be analyzed again, click the icon described below:

Icons to be used for specifying region



Click this icon to specify the region to be analyzed again. However, the current analysis results will be lost.

If the original image was already analyzed once, only the original analysis region in the image is usable for specifying the new analysis region.

Setting Parameters



To change the settings for the histogram, click this icon. The [Setup Parameters] dialog box will be displayed. Change the settings, then click OK. The analysis results in the image window will be updated to the settings immediately.

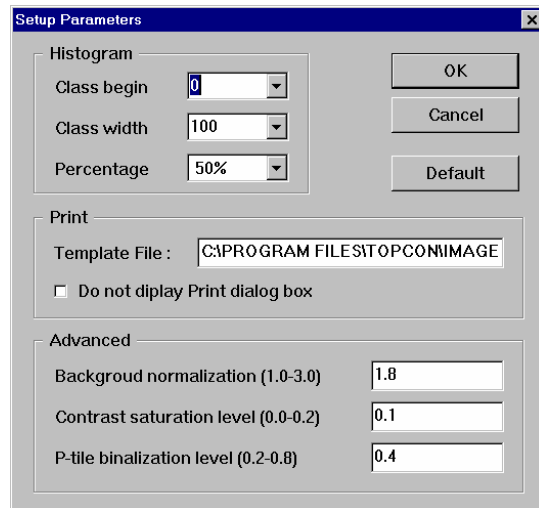


Figure 7. Setting Parameters

In the [Setup Parameter] dialog box, the following settings may be changed for the histogram and the print:

[Histogram]***Class Begin***

The measurement at which the histogram should begin. The default is 0 (square microns).

Class Width

The width of each bar. The default is 100 (square microns).

Percentage

The scale used for the ordinate axis. Choices are 25, 50, 75, or 100%. The default is 50%.

[Print]***Template File***

Specify a print template file used for the prints.

[Do not display Print dialog box] check box

Check this check box if the [Print] dialog box should not be displayed.

[Advanced]***Background normalization******Contrast saturation level******P-tile binarization level***

Result of the automatic boundary detection may be improved by adjusting the above 3 parameters. These parameters should be changed only by TOPCON representatives.

I.5 Printing Results

Printing to a Printer

The analysis results may be printed to a printer. The print contains the patient data (ID., name, eye), image data (date, procedure, label, etc.), and all of the results shown in the image window. An option also exists to send the analysis results to a disk file as text.

If the cell boundaries have been modified but the analysis is not performed yet using the modified boundaries, perform the analysis once again before start printing.

Icons to be used for printing



Click this icon to print the analysis results or to send the analysis results to a disk file. The [Print] dialog box will be displayed. Set any necessary parameters and click OK to start printing. This icon is disabled if the analysis has not been done.

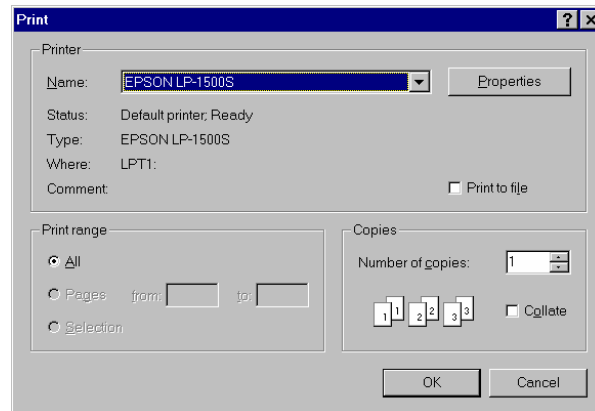


Figure 6. Print dialog box

The print created by the Endothelial Cell Analysis System is not a copy of the image window. If such a print is needed, exit this system, then use the 'Print' command in the 'File' menu of IMAGENet.

Sending to a File

If the [Print to a file] check box is checked in the [Print] dialog box, the [Print to File] dialog box will be displayed. Specify the output file, then click OK. The analysis result will be saved to the file as text. See Appendix for details of the file format.

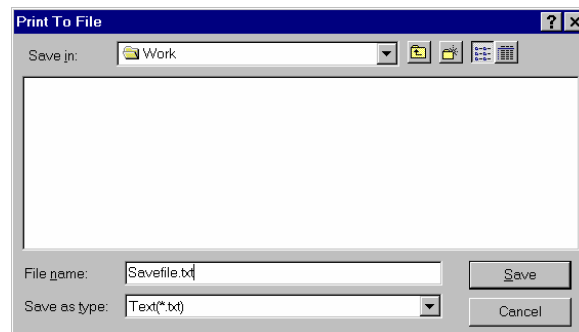


Figure 7. Print to File dialog box

I.6 Exiting the System

Exiting the System

To exit the Endothelial Cell Analysis System, click the OK button. The original image in the IMAGEnet window will be replaced by the analyzed image. To discard the analysis result, click the Cancel button. The original image in the IMAGEnet window will not be replaced.

If the cell boundaries have been modified but the analysis is not performed yet using the modified boundaries, the system will ask if the analysis should be performed before exiting the system.

Saving Analyzed Image

The Endothelial Cell Analysis System does *not* save the analyzed image either to the hard disk or to an archive disk. Returning to IMAGEnet, use the 'Save' command in the 'File' menu to save the analysis result to any disk.

I.7 Output File Format

The output file created by the Endothelial Cell Analysis System is a simple text file. All data items are stored as text and each text line terminates with the CR/LF characters.

IMAGEnet/CELL-5.00	File identifier
000-00-0000	Patient ID. code
Patient-01, TOPCON	Patient name
01-19-93	Capture date
cell	Procedure name
Mike1	Image label
0000	Disk No.
IMG0059	File No.
Comment	(Not available)
102	Number of cells
195.51	Minimum size
557.91	Maximum size
379.94	Average size
77.90	S. D. of size
20.52	C. V. of size
2632.43	Cell density
0	Heagonality mode
0.00	Ratio of triangles
0.00	Ratio of rectangles
20.63	Ratio of pentagons

59.32	Ratio of hexagons
17.46	Ratio of
1.59	Ratio of octagons
0.00	Ratio of above
325.46	Area of cell #1
523.97	Area of cell #2
333.21	Area of cell #3
511.43	Area of cell #4
386.77	Area of cell #5
288.08	Area of cell #6
.....	
.....	
467.22	Area of cell #102

Terms & Conditions

The materials available in this Manual (the "Manual") have been prepared by Topcon Medical Systems, Inc. ("TMS") for owners of IMAGEnet systems. It is designed to assist owners with the care and operation of the IMAGEnet systems. Use of the Manual is subject to these terms and conditions (the "Terms and Conditions"). PLEASE READ THESE TERMS AND CONDITIONS CAREFULLY.

COPYRIGHT - All information contained in this Manual is the intellectual property of, and copyrighted material of TMS. All rights are reserved. You may not use, access, copy, store, display, create derivative works of, sell, modify, publish, distribute, or allow any third party access to, any graphics, content, information or data in this Manual without TMS' express written consent and may only use such information for the care and operation of your IMAGEnet system. The information and data in this Manual are a valuable asset of TMS and are developed by the expenditure of considerable work, time and money, and are the result of TMS' original selection, coordination and arrangement.

TRADEMARKS. IMAGEnet, IMAGEnet, IMAGEnet Lite, IMAGEnet-X, IMAGEnet-H, IMAGEnet-640 and IMAGEnet-1024 are trademarks of TMS. Microsoft, MS, Windows and Windows NT are registered trademarks of Microsoft Corporation. Btrieve is a registered trademark of Pervasive Software, Inc. Product names mentioned herein may be trademarks of their respective companies.

USE OF IMAGENET SYSTEM SUBJECT TO AGREEMENT AND LICENSE. Ownership of the IMAGEnet System is subject to the Topcon Medical Systems, Inc. Terms of Sale for IMAGEnet and the IMAGEnet Software License Agreement which were supplied to you when you purchased the IMAGEnet system. Any service provided for the IMAGEnet System is subject to the terms of the Topcon Medical Systems, Inc. IMAGEnet Service Contract.

EXCEPT FOR ANY WARRANTIES IN SUCH AGREEMENTS, THIS MANUAL AND THE IMAGENET SYSTEM ARE PROVIDED "AS-IS." THERE ARE NO OTHER WARRANTIES. TMS DISCLAIMS ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR USE OR PURPOSE.

TMS SHALL NOT BE LIABLE FOR TECHNICAL OR EDITORIAL ERRORS OR OMISSIONS CONTAINED HEREIN; NOR FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM THE FURNISHING, PERFORMANCE OR USE OF THIS MATERIAL.

CONFIDENTIALITY. This Manual and its contents (jointly, the “Confidential Information”) are the confidential and proprietary information of TMS. You agree to treat TMS’ Confidential Information with a degree of care no less stringent than the degree of care you would use in safeguarding your own most valuable trade secrets. Nothing in this paragraph shall restrict you from disclosing Confidential Information to your employees as may be necessary or appropriate to operate or care for the IMAGEnet system. Such employees must also keep the Confidentiality Information confidential. In the event you become legally compelled to disclose any of the Confidential Information, you shall give TMS immediate notice of such legal compulsion so that it may seek a protective order or other appropriate remedy.

WEBSITE; OTHER STATEMENTS. No statement contained at the TMS website or in any other advertisements or TMS literature or made by an employee or independent contractor of TMS modifies these Terms and Conditions (including the warranty and limitation of liability).

MISCELLANEOUS. The above Terms and Conditions may be amended, modified, superseded, or canceled, at any time by TMS. The above Terms and Conditions will be governed by, and construed in accordance with, the laws of the State of New Jersey, without reference to conflict of laws.

WARRANTY AND LIMITATION OF LIABILITY.

Subject to these Terms, TMS warrants that for one (1) year from delivery to Customer, the IMAGEnet System will be free from material defects. If this warranty is breached, TMS, at its option, will either repair or replace the defective IMAGEnet System, or if not possible, refund the purchase price. The customer must contact TMS within the 1 year warranty period for the warranty to be effective. No warranties are given in connection with services or software. The warranty does not cover damage due to shipping or external causes, including, accident, abuse, misuse, problems with electrical power, servicing not authorized by TMS, usage not in accordance with instructions, failure to perform required maintenance, and/or problems caused by use of parts and components not supplied by TMS or any action which voids the warranty of a component manufacturer whose product and manual has been supplied as a component of the IMAGEnet System.

EXCEPT AS SET FORTH IN THE ABOVE PARAGRAPH, TMS MAKES NO WARRANTIES, EXPRESSED OR IMPLIED REGARDING THE IMAGENET SYSTEM, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR PURPOSE. TMS WILL NOT BE OBLIGATED TO HONOR ANY WARRANTY UNLESS IT HAS BEEN PAID IN FULL FOR THE IMAGENET SYSTEM. TMS DOES NOT ACCEPT LIABILITY BEYOND THE REMEDIES SET FORTH HEREIN, INCLUDING ANY LIABILITY FOR IMAGENET SYSTEM NOT BEING AVAILABLE FOR USE, FOR LOST OR CORRUPTED DATA OR SOFTWARE, OR FOR PROVIDING SERVICES AND SUPPORT. TMS WILL NOT BE LIABLE FOR LOST PROFITS, LOSS OF BUSINESS, LOSS OF DATA, COST OF COVER OR ANY OTHER CONSEQUENTIAL, INCIDENTAL, SPECIAL, INDIRECT OR PUNITIVE DAMAGES, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, OR FOR ANY CLAIM BY ANY THIRD PARTY (INCLUDING PATIENTS AND MEDICAL CAREGIVERS). THIS LIMITATION OF LIABILITY APPLIES TO ANY IMAGENET SYSTEM, SERVICES AND/OR SUPPORT THAT CUSTOMER PURCHASES FROM TMS. CUSTOMER AGREES THAT FOR ANY LIABILITY WHATSOEVER (WHETHER IN TORT, NEGLIGENCE AND/OR STRICT LIABILITY), TMS IS NOT LIABLE OR RESPONSIBLE FOR ANY AMOUNT ABOVE THE AGGREGATE DOLLAR AMOUNT PAID BY CUSTOMER TO TMS FOR THE PURCHASE OF IMAGENET SYSTEM.

THERE ARE IMPORTANT WARRANTY AND DISCLOSURE ITEMS IN THE MANUALS AND REFERENCE GUIDES ACCOMPANYING THE THIRD-PARTY COMPONENT PRODUCTS (E.G. THE MONITOR, THE HARD DRIVE, THE PRINTER) CONSTITUTING A PART OF YOUR IMAGENET SYSTEM. READ THIS INFORMATION CAREFULLY. IT MAY GOVERN YOUR RIGHTS, RISKS AND RESPONSIBILITIES WITH RESPECT TO SUCH THIRD-PARTY COMPONENT PRODUCTS.



Topcon Medical Systems, Inc. • 37 West Century Road • Paramus, NJ 07652
Phone: 1-800-867-2149 or 201-261-9450 • Fax: 201-261-9164 • www.topcon.com